Ambient Assisted Living Joint Programme

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AAL AMBIENT ASSISTED LIVING

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EXECUTIVE SUMMARY

This document focuses on the design of trial scenarios, which describe typical environments and typical scenes, in which the ALICE device prototype shall be tested in scope of work package 4.

Detailed test specifications will be specified in work package 4 once it is clear which technical modules are performing adequately to be included into the ALICE device prototype. The document serves as input to all technical work packages by providing a description on environments and typical events that need to be handled by the various modules.

Based on the end-user requirements and anticipated technical capabilities of the ALICE device prototype three different trial scenarios have been designed to cover a representative sample among the wide variety of situations which the end-user can encounter while using the ALICE device to navigate along a selected pre-annotated route towards a chosen destination. The first two trial scenarios cover outdoor navigation in a structured environment and in a semi-structured environment. The third scenario covers indoor navigation in a structured environment.

1. INTRODUCTION

For most people mobility is daily routine, while for blind and visually impaired persons mobility represents a major obstacle in interaction with the outside world. They must substitute their sight with other senses, using different aids. The most common mobility aid for blind and visually impaired is a white cane, followed by different optical aids, electronic aids, GPS and guide dogs. However, each of the mentioned aids has its advantages and disadvantages and they still require support of another person. For people, who lost their sight later in life training for mobility and orientation is very awkward and sometimes unpleasant too. On the other hand, nowadays many different electronic devices are already available but again, the problem is their accuracy. GPS for example doesn't alert the user of the dangerous obstacles in front of him, such as pillars, curves, posts or overhanging objects. It only provides the user with information about the right direction and approximate information about the distance from starting point to the final destination. In this sense, the Alice device aims to perform a leap forward in the development of electronic navigation systems for blind and visually impaired people.

The objective of the ALICE project is to construct a platform which matches the navigation needs and interests of people from the age group called *young-old* (people from 55 to 75 years of age) with visual impairments. Testing and evaluation of the platform will be conducted via a series of field trials in later phases (work package 4) of the project following the test specifications that will be designed in work package 4 based on the trial scenarios designed in this first phase of the project.

Prior to building the trial scenarios, literature referring to tests of related assistive devices has been examined (e.g. Baranski et al., 2009; Bujacz et al., 2008; Ivanchenko et al., 2009; Ganz et al., 2012).

A prerequisite to the project's success is an understanding of the end-user's needs and requirements. Therefore, a close cooperation between the end-users and technical partners has been established and this has been a key factor for efficient design of adequate trial scenarios. Three different trial scenarios have been designed for this purpose. The trial scenarios consist of multiple basic scenario events (elements), which have been designed to cover the high-level device functionality that has been derived from the end-user specifications in a best possible way. Additionally, different user's characteristics have been taken into account.

The trial scenarios address the following two major application environments:

- outdoor navigation
  - structured environment (urban area – walking through city centre for example)
  - semi-structured environment (urban park - walking through a city park)
- indoor navigation
  - structured environment (pedestrian tunnel under the railroad/highway)

This deliverable defines the main characteristic and basic elements that define a particular scenario. For each trial scenario different situations and scenes are predicted as well as the conduct of the device at certain levels. Since the User Centered Design (UCD) concept is being used throughout the project, the trial scenarios will be modified and improved during the different phases of the project whenever needed (trial iterations, new requirements, modifications).

The outcomes of the deliverable are crucial for testing and final evaluation, as the trial scenario's scenes and situations will serve for end-user testing and evaluating of the product.

The structure of the document is as follows: introduction is followed by a short presentation of end-user's characteristic, in Section 3 the end-user requirements are briefly described, while Section 4 provides detailed information about each trial scenario. The final conclusion emphasizes and summarizes the major outcomes of this deliverable.

2. END-USERS

As it has been mentioned in section 7.1.3 of deliverable D.1.1 (Cunill, et al, 2013a), in order to carry out a successful analysis of end-users, the first step to follow is to target the users or to classify them according to their distinguishing features within the project context. In this sense, the target group of this project are principally people in the age group called young old – people from 55 to 75 years of age with visual impairments. The reason to choose this age range is because life expectancy is rising, and elderly people are more likely to have some vision problems.

The end-users testers will be chosen by two specialized organisations who are partners in the project: UBPS from Slovenia and COMBD from UK.

Four groups will be assembled in total, two groups in Slovenia and two groups in the United Kingdom. One of these two groups for each country will be partially sighted and the other group will be totally blind. The main features of end-users that will participate in the project are shown in Table 1.

Target groups of end-users	
Number of groups	4 groups (2 in UK, 2 in SLO).
Characteristics of subgroups	In each country 2 groups (1 blind and 1 partially sighted)
Age of participants	55-75
Number of participants	20 (in each country)[1]

Table 1: Tester groups characteristics.

In order to have a wide range of testers and to obtain as much diversity of opinions as possible, testers with different levels of vision and various diseases will be selected.

The estimated profile of the testers which will be provided is shown in Table 2. The description of these diseases is detailed in Sections 7.11 and 7.12 of deliverable 1.1.

[1] For project purposes a total of 15 test participants is a minimum. In order to avoid some problems, which might occur later on because of possible participant's withdrawal, we suggest 18-20 people (9-10 for each group).

Glaucoma
Macular Degeneration
Cataract
Diabetes

Table 2: Causes of visual diseases of testers.

3. END-USER REQUIREMENTS

The analysis of the end-user needs and requirements that has been undertaken within D1.2 (Cunill, et al, 2013b) has shown that despite the technological achievements and development so far, mobility aids for blind and visually impaired people are still remaining a dark spot. There are many reasons why this is so. Certainly, the group of blind and partially sighted people is so diverse that it is really hard to fulfill all their requirements and needs. Furthermore, the level of sight loss and the age of onset of sight loss have significant impact on the individual. On the other hand, all electronic devices that have been offered so far have many disadvantages, manifested mostly as inaccuracy of the system. However, for the blind **accuracy** is not only important but can be a matter of life or death. For example the exact information about location is required to enable **safe travel**. By drawing up a questionnaire which served as the basis for further analysis, researchers aimed to gather as many user requirements as possible to ensure the optimal development of the Alice device. Nevertheless, the sheer quantity of the derived data could kill the project thus the results were prioritized and both wish-lists as well as high-level functional specifications were derived from the user requirements for the prototype 1 (more details can be found in Cunill, et al, 2013b).

Participants emphasized many important aspects of their life, which impact on their mobility abilities. Most of them are using only familiar routes, due to safety reasons. They envisage Alice as an efficient and supportive device, which should enable them to travel also along unfamiliar routes in safe conditions and without a guide. Obstacles that users want to be warned about are: posts, pillars, curves, overhanging branches, the edge of pavements, street furniture, steps, down slopes, ramps, holes, bumps etc. Moreover, users want to be warned about moving objects, especially about bicycles. A bicycle detector is therefore more needed then human or car detector, which is important when they are crossing the street. Respondents expressed the necessity of help-button in case of emergency and text-to-speech synthesis in their mother tongue.

3.1. HIGH-LEVEL FUNCTIONAL SPECIFICATIONS

As detailed in D1.2, high-level functional specifications were defined. For the purpose of this deliverable the main ones for prototype 1 were derived as listed below:

- Annotated routes should have clear starting and final point.
- Information about how far the final destination is.
- Information what is nearby and the points of interest along the route.
- Waypoint information – the route description.
- Information about the current position.
- Information about GPS.
- Information about the distance to the last/next waypoint.
- Information about the direction the user is currently facing.
- Information about the direction in which the user should walk.

- Detectors for pedestrian crossing and the direction of crossing.
- Detectors for traffic lights, which warn the user when is the green light.
- Moving object detector - user is warned about the moving objects. Bicycle detector is more crucial than human detector.
- Detectors for different obstacles (vertical and horizontal), detector for stairs.

4. TRIAL SCENARIOS

4.1. OBJECTIVES AND PROCEDURES

The technical platform which matches the navigation needs and interests of the target user group will be designed in later phases of the project. Based on the results of the end-user requirements high-level functionalities have been derived as mentioned in Section 3. A detailed description of both can be found in deliverable D.1.2 (Cunill et al, 2013b). The platform functionality will be in a later stage also evaluated and tested by the end users in the scope of the activities foreseen for work package 4.

By taking into account the first phase of the project which focuses on user requirements, the specific objectives which will be achieved throughout the development of the work package work package 1 have been defined and summarized as follows:

- To involve users in the project development and assign them an active role in the definition of the system.
- To identify user needs in the project development and assign them an active role in the definition of the system.
- Derive high level functional specifications.
- Design testing and perform user evaluation.

Testing of the platform will be conducted via field trials following the trial scenarios designed in this first phase of the project. Detailed test specifications will be specified in work package 4 once it is clear which technical modules are performing adequately to be included within the ALICE device prototype.

Trial scenarios in this phase can be considered as a guideline for the typical environments and scenes encountered in the first test of the ALICE device.

This document also serves as input to all technical work packages by providing a description of environments and typical events that need to be handled by the various modules. In order to facilitate such work package interaction the trial scenarios are described as a sequence of multiple basic scenario events or elements. **Basic scenario elements** are designed in a way that they cover the high-level device functionality that has been derived from the end-user specifications in the best possible way.

By following the principles of the User Centered Design (UCD) we aim to make sure that the trial scenarios will be modified and improved throughout different phases of the project whenever necessary (trial iterations, new requirements, modifications, technical capabilities and performance accuracy of the ALICE modules) until they evolve into trial scenarios that cover the environments and typical events in which the final testing in scope of work package 4 will be performed.

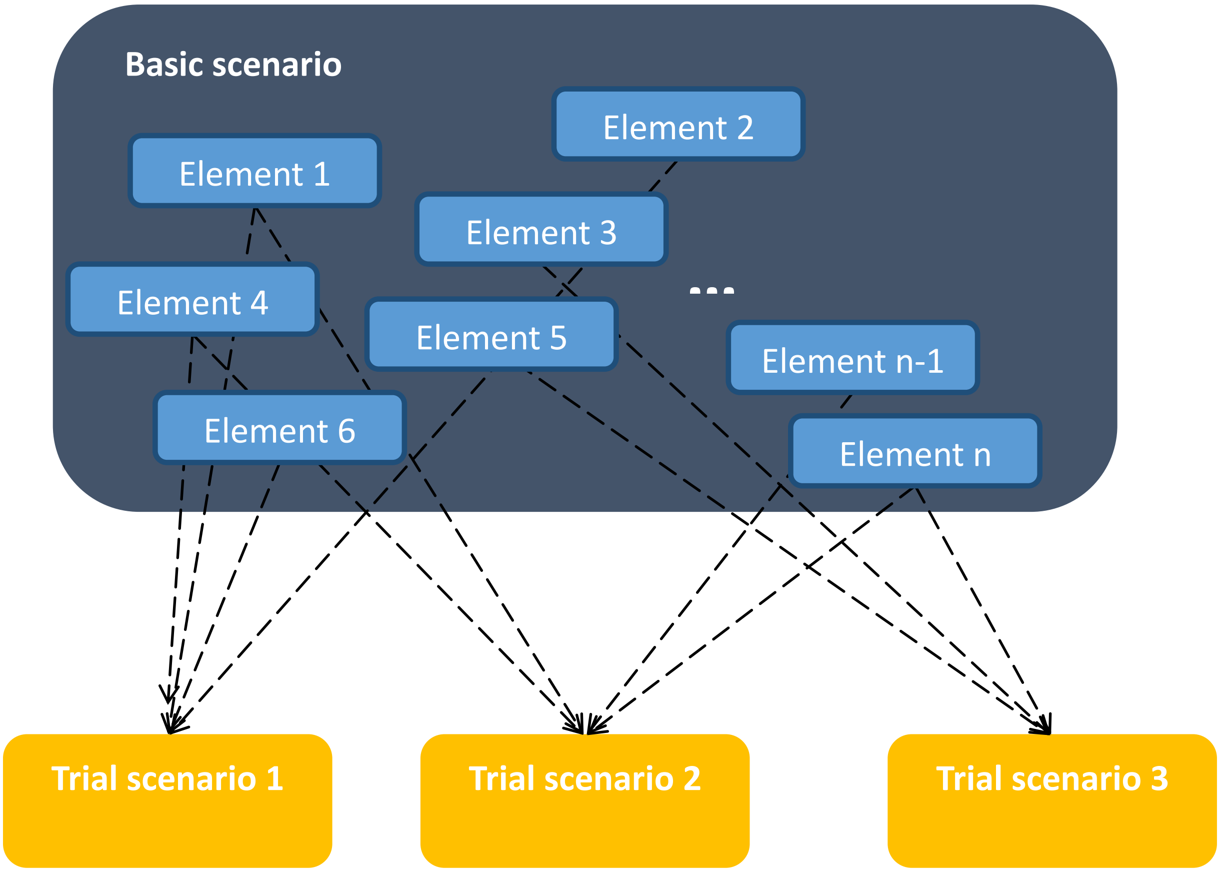


Figure 1: Each trial scenario consists of multiple basic scenario elements

4.2. USER CENTERED DESIGN

User Centered Design (UCD) means a development approach which focuses on the end-users who will use the product or service created (Courage & Baxter, 2005). The aim of UCD is that the product/service developed should suit the user, rather than making the user suit the product/service. This is accomplished by employing techniques, processes, and methods throughout the life cycle of the product/service, that maintain the focus on the user from the very beginning until the end. There are three key principles of UCD (Courage & Baxter, 2005) which we apply throughout the project:

- **An Early focus on Users and Tasks:** The first principle focuses on the systematic and structured collection of users' requirements. By letting the user be involved from the beginning, the usability of a product and the usefulness of a service are maximized. The earlier the end-user is involved in the project the earlier inappropriate project work will be avoided. Thus the first step to be carried out in ALICE is to gather user requirements to get an understanding of what the user really wants and needs.

- **Empirical Measurement of Product/Service Usage:** This principle focuses on the usability and testing of prototype/models. A usability test is provided to users who are furthermore asked to complete a session of tasks with a prototype or the final product. Different metrics such as errors and task completion rates are analyzed in order to improve the product/service before the final version is developed.

- **Interactive Design:** The final principle recommends that collected requirements are used to design, modify, and test repeatedly the product/service. The development cycle is not something merely to go through; it is continuously iterated and fine-tuned with each cycle until the best product/service is obtained.

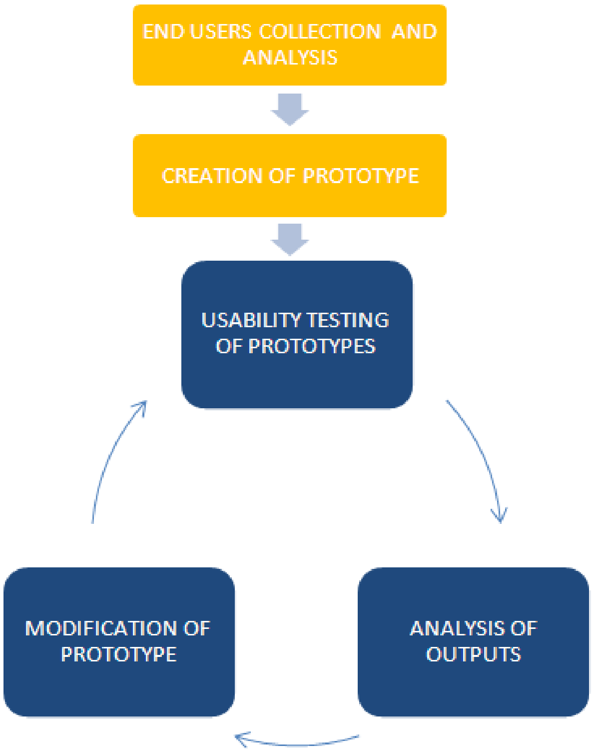


Figure 2: Schema of the UCD

The requirements, needs and wishes of end-users form the backbone of the ALICE project. As it has been mentioned in several sections, they were collected, compiled and analysed from the very beginning of the project in order to have a bottom-up approach.

The end-users will be involved in each of the iterations. By user involvement in the design phase the system will improve and new requirements can be included with each of the iterations until all the features are in place.

4.3. BASIC SCENARIO EVENTS (ELEMENTS)

Trial scenarios consist of multiple basic scenario events (elements). Scenario elements are designed in a way that they cover the high-level device functionalities that have been derived from the end-user specifications in the best possible way.

Basic scenario elements
Information about nearby POI (Points of interest) Waypoints in proximity to the selected route, but not direct markers of the route itself
Waypoint information Waypoint description, type of approach, how to continue our route
Information about the user's current position Calculated as projection to the nearest segment of the route/path
GPS position information
GPS signal accuracy information
GPS position correction In regards to expected route
Distance from the last waypoint Calculated on a basis of GPS/INS navigation
Distance and direction to the next waypoint Calculated on a basis of GPS/INS navigation
User's direction The direction the user is currently facing
User's direction vector Walking direction of the user, which is actually average of user's direction of travel values over time
Path's bearing Direction in which the user should walk
Information about user's movement

User is moving or standing still
Guiding of the user Controlling the drifting from the ideal trajectory
Marked pedestrian crossing detector (ground markings detector) Pedestrian crossing detector detects zebra markings and notifies the user when to stop. It also provides the user with the information about the direction (angle) of the crossing. The user must be facing the crossing at a 90 degree angle – the system is informing the user about the direction with a help of sound signal / vibrations.
Navigation across pedestrian crossing It helps the user navigating across pedestrian crossing so the user would not stray away too much from the ideal path across zebra markings (90 degrees angle)
Traffic light detector (optional)[2] Informs the user about a presence of a traffic light apparatus
Traffic light signal detector (optional) In addition if and only if the system detects the presence of the traffic light apparatus, it can also check the traffic light signal status (color)
Moving objects detector Detection and possible classification of common moving objects : bicycle, car, people
Obstacles – vertical columns, pillars and poles
Obstacles – horizontal barriers
Obstacles – stairs
Recognition of pre-trained objects (doors, bench, bus station, metro, store…)
Path detection Outdoor - structured and unstructured environment
Corridor detection Indoor - structured environment
Detection of direction changes

[2] An optional scenario element is an element that is not manadatory according to the project proposal but has been identified as useful by the end-users. If the developed technical module performs adequately it shall be included in the final scenario description.

Indoor
Navigating (guiding) the user along the path Outdoor and indoor
Visual guidance of the user in the path's direction

Table 3: Basic scenario elements

4.4. DEFINING SUITABLE SCENARIOS FOR FIELD TRIALS

Usability testing of prototypes will be conducted via field trials. We designed three different trial scenarios. The first two trial scenarios relate to outdoor navigation – first in a structured environment (urban area – walking through city centre for example) and secondly in a semi-structured environment (urban park - walking through a city park). The third trial scenario covers indoor navigation in a structured environment (pedestrian tunnel under the railroad/highway or shopping center).

On the following pages these three representative trial scenarios are described in more detail.

TRIAL SCENARIO #1

Outdoor – Structured environment

Figure 3: Trial scenario # 1: Navigation in a structured outdoor environment

The first trial scenario involves a user walking a predefined route in a **structured outdoor environment.**

The main characteristics and basic scenario elements that define this scenario are the following:

- All routes are annotated in advance
- The system is checking the distance to the waypoint while the user is walking (approaching the waypoint)

- System tolerance is the highest in the urban environment. The system calculates it on a basis of GPS position accuracy
- The system is continuously/actively checking if a user is still on the path and it does not stray away
- Obstacle detectors are active all the time. Pedestrians, cars and columns/pillars are treated as obstacles.
- At a distance of approximately 15 m from the waypoint the system alerts the user for the first time with the waypoint description, followed by:
    - information on how to recognize the waypoint in question and
    - information about the required actions.
- At the same time the ground markings detector as well as detection of pre-trained objects is activated (marked pedestrian crossing detector).

An example of a route map for a trial scenario #1 is shown in Figure 4:

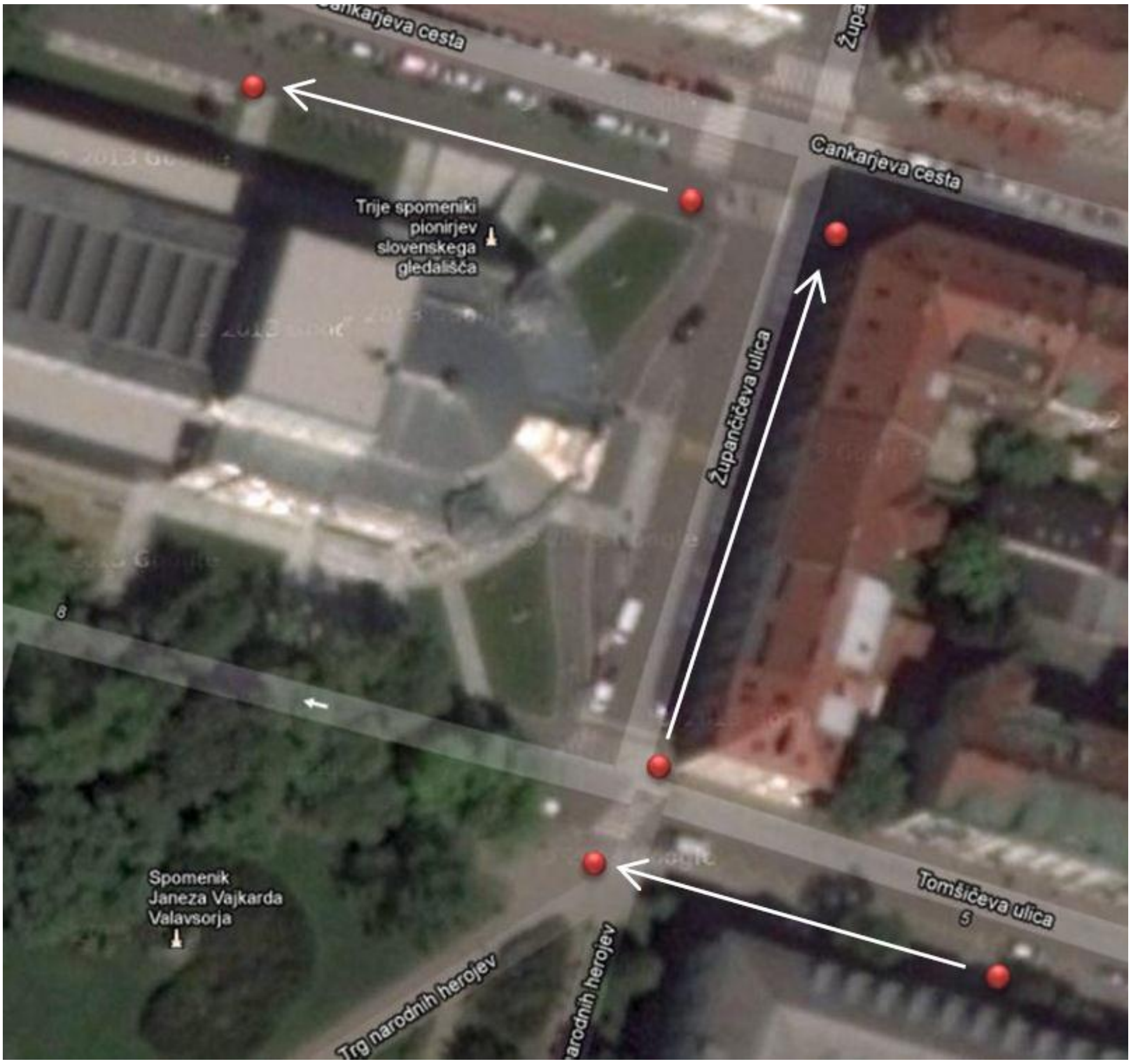


Figure 4: Typical route map for trial scenario #1

Typical scenes and situations that can be encountered in trial scenario #1 and the actions that the ALICE system needs to perform at each one of them are listed in the following table. A sample trial scenario involving a **walk in an urban area** is described:

Urban area	
	• **Situation: Start** • System checks the vicinity of a starting waypoint • Orientation check • Navigating user • Distance to waypoint check • Instructions for approaching the waypoint
	• **Scene: approaching pedestrian crossing** • Acquiring the GPS accuracy at a present location (10m) • Approaching the waypoint alert • Detector starts searching for a pedestrian crossing markings • Waypoint description (pedestrian crossing on the right) • Physical characteristics of the waypoint (columns) • The system uses vibrations to inform the user about precise location of the crossing • Activities when user reaches the waypoint (right turn)
	• **Scene: navigating across the pedestrian crossing** • Orientation check (crossing detection in only one direction) • Pedestrian crossing detected alert • Pedestrian crossing orientation (tactile guidance) • Continuously informing the user about the correct direction

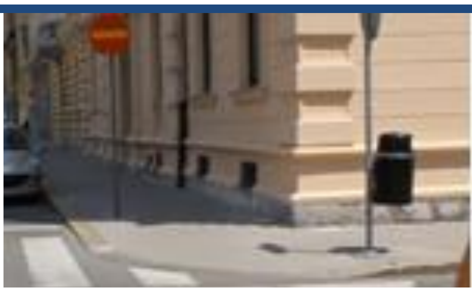
	• **Situation: approaching the far side of the crossing** • Accurate measurement of the traveled distance using INS navigation • Description of waypoint (corner of a building) • Physical characteristics of the waypoint (traffic sign) • The system uses vibrations to inform the user about precise location of the waypoint • Activities when user reaches the waypoint (proceed along a building)
	• **Scene: approaching another pedestrian crossing** • Acquiring the GPS accuracy at a present location (20m) • Approaching to the waypoint alert • Detector starts searching for the pedestrian crossing markings • Waypoint description (pedestrian crossing on the left) • Physical characteristics of the waypoint (corner of a building on the right) • The system uses vibrations (vibrates heavily) to inform the user about precise location • Activities when user reaches the waypoint (left turn)
	• **Scene: navigating across the pedestrian crossing** • Orientation check (crossing detection in only one direction) • Pedestrian crossing detected alert • Pedestrian crossing orientation (tactile guidance) • Continuously informing the user about the correct direction

Table 4: Sample typical route for trial scenario #1

TRIAL SCENARIO #2

Indoor – Structured environment

Figure 5: Trial scenario #2 – Indoor environment – partially covered route

The second trial scenario involves a user walking a predefined route in a **structured indoor environment**.

The main characteristics and basic scenario elements that define this scenario are the following:

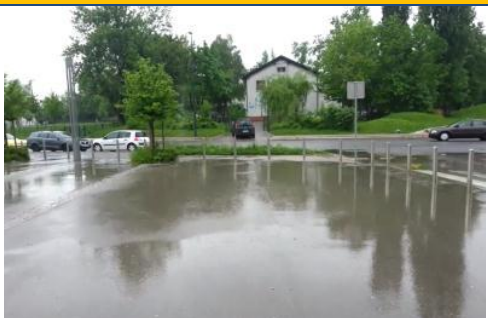
- All routes are annotated in advance
- The system uses INS navigation (Inertial Navigation System)
- The system is checking the distance to the waypoint while the user is walking (approaching the waypoint)
- The system is continuously/actively checking if a user is still on the path and does not stray away
- Obstacle detectors are active the whole time. Pedestrians, cars and columns/pillars are considered to be obstacles. Detectors for user guidance are also active.
- System tolerance in this environment is set to minimum
- At a distance of approximately 2 m from the waypoint the system alerts the user for the first time with the waypoint description,
    - followed by the information on how to recognize the waypoint in question and
    - information about required actions.
- Information about obstacles on the path
- Other relevant environment related information

- Indoor location detection (Count Satellites)
- When absence of satellites is detected switch to INDOOR mode
    - each waypoint from the route is confirmed manually (system waits the confirmation from the user, counter reset)
    - The system uses Inertial Navigation
- For successful indoor navigation the user requires:
    - Bearing (Direction in which the user should walk to reach desired destination)
    - Distance to the (next) waypoint
- Distance can only be measured using pedometer
- Limitations:
    - This trial scenario cannot include all possible situations.
    - Indoor system cannot use GPS positioning information to check the user's position.
    - Trial scenario must not be complex: user navigation will be done using compass, pedometer and movement information.
    - The key factor in this trial scenario is accuracy – to successfully navigate indoors each waypoint from the route must be confirmed by the user.

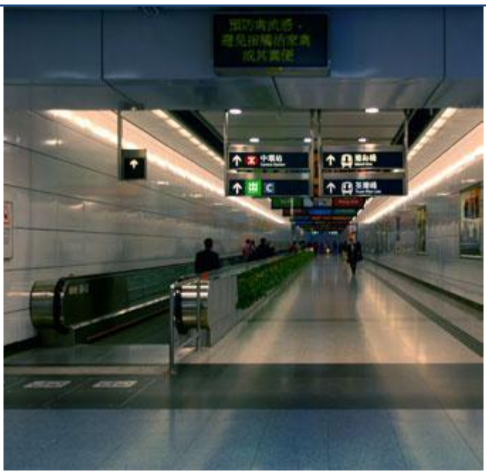
An example of a route map for a trial scenario #2 is shown in Figure 6:

Figure 6: Typical route map for trial scenario #2

Typical scenes and situations that can be encountered in trial scenario #2 and the actions that the ALICE system needs to perform at each one of them are listed in the following table. A sample trial scenario involving the **crossing of a pedestrian tunnel under a railway station** is described:

Pedestrian tunnel under the railway station	
	• **Position: Start** • System checks the vicinity of a starting waypoint • Orientation check

	• **Position: Start waypoint**
	• When all of the initial conditions are met:
	  ○ Description of the waypoint (entrance to a pedestrian underground tunnel)
	  ○ Physical characteristics of the waypoint / region-based approach (escalators – left side)
	• Orientation check
	• Navigating user
	• Directions on how to continue along the path

	• **Position: navigating corridors** • Orientation and position check (INS navigation) • Detection of the visual markers (bright-colored walls) • Approaching to the waypoint alert (underground corridor) • Description of the waypoint (conveyor – left side, passage – right side) • Physical characteristics of the waypoint / region-based approach (turn towards right) • User guidance and navigation • User manually confirms each reached waypoint • Directions on how to continue along the path (continue along the right-side edge)

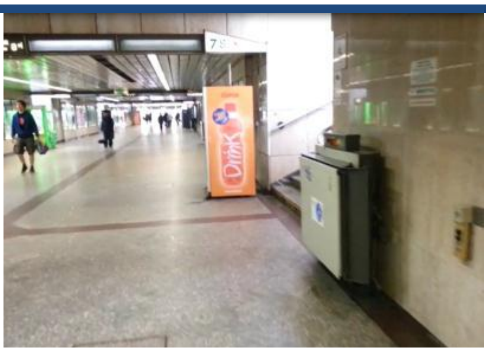
	• **Position: approaching stairs / escalators** • Orientation and position check (INS navigation) • Detection of the visual markers (bright-colored walls) • Approaching to the waypoint alert (access to terminal 7) • Description of the waypoint (stairs / escalators) • Physical characteristics of the waypoint / region-based approach (stairs / escalators expected – right side)
	• **Position: stairs / escalators** • User checks if he reached the stairs / escalators • User manually confirms each reached waypoint • User guidance and navigation (turn right) • Directions on how to continue along the path (stairs / escalators running up – right side)
	• **Position: Terminal 7** • User manually confirms each reached waypoint • Orientation and position check (INS navigation) • Detection of the visual markers (dark-colored walls) • Approaching to the waypoint alert (terminal 7) • Description of the waypoint (railway – left and right side) • Physical characteristics of the waypoint / region-based approach (turn towards right) • User guidance and navigation • Directions on how to continue along the path (train expected – right side)

Table 5: Typical route description for trial scenario #2

TRIAL SCENARIO #3

Outdoor – semi-structured environment

Figure 7: Trial scenario #3 –semi-structured outdoor environment

The third trial scenario involves a user walking a predefined route in a **semi-structured outdoor environment**.

The main characteristics and basic scenario elements that define this scenario are the following:

- All routes are annotated in advance and are circular in nature (leading back to the start location)
- The system is checking the distance to the waypoint while the user is walking (approaching the waypoint)
- System tolerance is lower than in the urban environment
- The system is continuously/actively checking if a user is still on the path and does not stray away
- Obstacle detectors are active the whole time. Pedestrians, cars and columns/pillars are treated as obstacles. Detectors for user guidance are also active.
- At a distance of approximately 7 m from the waypoint the system alerts the user for the first time with the waypoint description,
  - followed by the information on how to recognize the waypoint in question and
  - information about required actions.

- Possible problematic scenes: short path sections, curved paths, circular paths, walking through open area with no detectable edges

An example of a route map for a trial scenario #3 is shown in Figure 8:

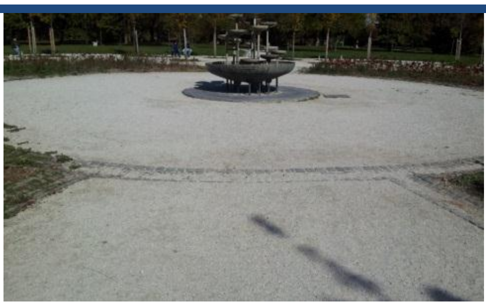
Figure 8: Typical route map for trial scenario #3. Some path stretches are occluded by tree shades.

Typical scenes and situations that can be encountered in trial scenario #3 and the actions that the ALICE system needs to perform at each one of them are listed in the following table. A sample trial scenario involving a **walk in a city park** is described in Table 6.

City park	
	• **Position: Start waypoint** • System checks for the vicinity of a starting waypoint • System checks the orientation of the user

	• **Position: Start waypoint**
	• When all of the initial conditions are met:
	    o Description of the waypoint (entrance to a park)
	    o Physical characteristics of the waypoint / instructions on how to approach the waypoint / region-based approach (concrete pathway with edge of stone)
	• Orientation checking
	• Navigating the user
	• Directions on how to continue along the path (continue along the right side / stay on the right-side edge)

	• **System is actively navigating the user** • Detection of visual markers (left and right edge of the path) • Detection of nearby objects of interest • Obstacle detection (pedestrians, cyclists, cars) • Checking the distance to the nearest waypoint
	• **System is actively navigating the user** • Detection of visual markers (left and right edge of the path) • Detection of nearby objects of interest • Obstacle detection (pedestrians, cyclists, cars) • Checking the distance to the nearest waypoint

	• **System is actively navigating the user** • Detection of visual markers (left and right edge of the path) • Detection of nearby objects of interest • Obstacle detection (pedestrians, cyclists, cars) • Checking the distance to the nearest waypoint
	• **System is actively navigating the user** • Detection of visual markers (left and right edge of the path) • Detection of nearby objects of interest • Obstacle detection (pedestrians, cyclists, cars) • Checking the distance to the nearest waypoint
	• **Position: Navigating intersections / crossroads / junctions** • Orientation checking • Position checking • System is actively navigating the user • Detection of the visual markers (crossroads / X junction) • System checks for a nearby waypoint (path branching or forking) • Description of the waypoint (type X) • Physical characteristics of the waypoint / region-based approach (straight across the crossroads) • At a distance of approximately 5 m from the waypoint the system issues a turn command • Directions on how to continue along the path (continue along the right edge)
	• **Position: Navigating intersections / crossroads / junctions** • Orientation checking • Position checking • System is actively navigating the user • Detection of the visual markers (Y junction)

	• System checks for a nearby waypoint (path branching or forking) • Description of the waypoint (type Y) • Physical characteristics of the waypoint / region-based approach (walk along the right edge) • At a distance of approximately 5 m from the waypoint the system issues a turn command • Directions on how to continue along the path (continue along the right edge)

	• **Position: Navigating stairs**
	• Orientation checking
	• Position checking
	• System is actively navigating the user
	• Detection of the visual markers (path edge)
	• System checks for a nearby waypoint (Radetzky park)
	• Description of the waypoint (stairs)
	• Detector activation
	• Physical characteristics of the waypoint / region-based approach (walk along the right edge)
	• At a distance of approximately 5 m from the waypoint the system issues a turn command
	• Directions on how to continue along the path (continue along the right edge)
	• Upon stairs detection:
	    ○ Focusing attention on the detected object (stairs)
	    ○ Correcting the user orientation

	• **System is actively navigating the user** • Detection of visual markers (left and right edge of the path) • Detection of nearby objects of interest (sitting bench) • Obstacle detection (pedestrians, cyclists, cars) • Focusing attention on the detected object of interest

	• Checking the distance to the nearest waypoint
	• **System is actively navigating the user** • Detection of visual markers (left and right edge of the path) • Detection of nearby objects of interest (sitting bench) • Obstacle detection (pedestrians, cyclists, cars) • Focusing attention on the detected object of interest • Checking the distance to the nearest waypoint

Table 6: Route description for trial scenario #3

CONCLUSIONS

This deliverable defines the trial scenarios, which describe typical environments and typical scenes for testing and final evaluation of the Alice prototype in further phases of the project. The document outlines the basic scenarios as sequences of multiple basic scenario elements, which have been designed to cover both the high-level device functionality that has been derived from the end-user requirements, as well as different user's characteristics which have been taken into account. Detailed test specifications will be specified in work package 4 once it is known which technical modules are accurate enough to be included in the ALICE device prototype. The document serves as input to all technical work packages by providing a description on environments and typical events that need to be handled by the various modules.

Three different scenarios were designed for structured environments (urban area), semi-structured environments (parks) and indoor structured environments (pedestrian tunnel). This deliverable provides the main characteristics and basic elements that define a particular scenario. For each trial scenario different situations and scenes that may occur were also predicted as well as the anticipated conduct of the device at a certain level.

Since the User Centered Design concept is being used throughout the project, the trial scenarios can be modified at future steps of the project whenever that will be necessary.

Overall, the outcomes of the document significantly impact the testing and evaluation process, which forms part of work package 4.

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