RIDERTRACK

Requirements Definition Document

Version: 2.0.0

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Index

Revision History

Date	***Version***	***Description***	***Responsible***
27/10/2017	0.1	Initial draft	Alessandro Caprarelli
10/11/2017	1.0	First versions	Alessandro Caprarelli
16/12/2017	2.0	Dropped additional features such as messaging and private data. Additional info about the rationale behind the decision can be found in the Plan document v2.0.	Alessandro Caprarelli

1. Introduction

1.1 Purpose of the document

The *Requirements Definition Document* is intended for describing the main features of the "**Rider Track"** system, a responsive web interface supporting multiple forms of tracking input for participants in sport Events. This document is aimed to describe system objectives, functionalities and limits, starting from the needs of the stakeholders and in a form which fits for the purpose to create an analytics documentation, useful both for the communication between the customer and the developers and for subsequent implementations as well. It addresses the developers and programmers who have to implement the requirements, and more generally, all the stakeholders involved in the software conception and fulfillment.

1.2 Document Organization

This document is essentially structured in four parts:

1. In this **first section**, we provide an introduction to the general problem, which we are going to develop in our system.
2. The **second section** explains which are the main functionalities of the product and an high level overview.
3. In the **third section**, we deeply analyze the functional requirements of our system, associated to each user story and explain the structure using Use Cases.
4. In the **fourth section,** we present the non-functional requirements, that our system will include.
5. Finally in the **fifth section,** we present some future implementation that can enhance the service offered to the final users.

1.3 Intended Audience

The target audience of this document includes:

- **Users:** this category holds three different kinds of users, united by the common potential interest in the project to be and distinguished by habits, interests and, especially, by the way **"Rider Track"** would improve their life experience. Below, the distinction:
    1. *Athletes:* runners, bikers, riders, marathon or trail runners, whoever loves and participates to sports events. In the document can be called also event's participants.

2. *Spectators and supporters:* whoever is interested in following a competition.
3. *Event organizers:* whoever wants to organize an event, supplying the most user-friendly and performing experience to their participants and spectators.

- **Project customer:** to check if the work planned by the team is coherent with his requirements and to agree upon the major objectives.
- **Developers:** to allow the developers to understand the project and to work individually with a unique shared idea of the goal to be reached.

1.4 Definition and Acronyms

1.4.1 Definitions

Keyword	*Definition*
Sport event	An event such as a marathon, cycling race, hiking race ecc. In general a sport event with a route, a starting point and an ending point.
Full Responsive Web Application	It defines a web application that can adapt its graphical user interface to multiple devices such as Desktops, Tablets and Mobile phones.
User-friendly	This term is associated with the usability of the application. It is said of a certain application, which provides an easy and immediate interface, that allows the user to easily interact with it.
Real Time Tracking	It defines tracking of participant during an event, that is provided in a certain delta time to the application that will be of a few minutes. (to set after a feasibility test, during the implementation)

1.4.2 Acronyms and Abbreviations

Abbreviation/Acronym	*Definition*
G[i]	Identifier of the goal ‘i’
FR[i]	Identifier of the functional requirement ‘i’
NFR[i]	Identifier of the non functional requirement ‘i’

UC[i]	Identifier of the use case ‘i’
US[i]	Identifier of the user story ‘i’
[PG]	Source: Project Group
[C]	Source: Customer

1.5 References

- *“Project Vision and Plan v2.0”* , Alessandro Caprarelli, Marzia Degiorgi, Mariano Etchart, Giulia Leonardi, Josip Mališa, Ante Brescic, Ivan Kvesić, 2017.
- *“Design Description Document v2.0”* , Alessandro Caprarelli, Marzia Degiorgi, Mariano Etchart, Giulia Leonardi, Josip Mališa, Ante Brescic, Ivan Kvesić, 2017.
- SCORE project detail: http://score-contest.org/2018/projects/ridertrack.php

2. Overall description

2.1 Background and State of Art

As it has been defined in "The Project Vision and Plan" document, the main problem which affects event organizers, who want to use a real-time tracking service during his/her competition, is the cost: in fact, event organizers should provide a tracking device to each participant.
Besides, another particular aspect regarding tracking services, that an event organizer has to face, is the impossibility of integration of multiple different input sources to track an event within the same platform. In fact, once the administrator chooses a certain company for the tracking infrastructure and services, the event in question will be equipped only with devices and services of that company.
All this problems underlight the need of a more flexible platform, that allows participants to use their own devices, in order to simplify procedures and to reduce costs for event organizers, making both the management and the participation to sport events easier and more accessible to everyone.

2.2 Scope

The aim of the **"Rider Track"** system is to provide an user-friendly management service for outdoor sport events and, especially, to support multiple input forms of tracking sources, even ones not introduced yet.
The project main goal is to simplify the organization behind an event and, at the same time, to foster the participation of the athletes to whichever kind of race they could be interested in joining. To reach this scope, a flexible and extensible system will be developed, with the aim of integrating tracking data from multiple sources. On one hand, the system will guarantee a noteworthy savings for the event administrator, who won't be forced anymore to provide necessarily a specific professional tracking device to each participant of the race, and on the other hand, it will allow athletes owning whichever different tracking device to compete all together in the same race, each of them with their already owned gadget.

2.3 Actors

Guest: user who not already registered in the system or who has not logged in yet. He/she can only see the public sections of the web site: home page, login and registration page, list of events, details of a single public event.
Moreover event spectators are guest user because they do not need to be registered in the system.

User: a registered user who has access to additional functionalities beyond those of the guest. The User is allowed to see the list of all the past events he/she has already participated, all the future events he/she has enrolled in and all the events he/she organized by him/her. He/She is allowed to create new events and modify those created by him/her. Moreover, he/she can modify his/her profile information.

With respect to a *each event*, the user can embody different roles:

1. **Event Participant**: registered user who enrolled to an event. He/She can unroll him/herself to that event.
2. **Event Administrator**: registered user who created an event. He/She can modify, delete, archive, start and stop the tracking of that event.

System administrator: a special user that has all the functionalities of a guest, plus the access to some special functionalities of the system from which he/she can change information about all the users and events held by the system. This user can not be registered.

2.4 Assumptions

It is assumed that event participants use the same credential to login in the web application and in the native mobile application. The latter is thought just to collect data, during an event, about participants' performance.
It is assumed that the web application is addressed to spectators, event participants, event organizers and system administrators. It will be totally responsive: this allows it to be easily used both on mobile devices, such as smartphones and tablets, and on computers.

3. Functional requirements

3.1 Requirements and User Stories

3.1.1 Requirements

The table below shows the list of functional requirements defined by the Team together with the customer.
Some requirements were dropped, with the approval of the customer. A complete and detailed rationale about the decision can be found in the "*Project Vision and Plan v2.0*" document in the "Major changes to project plan" chapter.

ID	Name and Description	Motivation
ACTOR: *Guest*		
FR1	**Registration:** 1. The system must allow the guest user to decide to register him/herself. *[PG]* 2. The system must allow the guest user to register, providing his/her personal data (name, surname, date of birth, a unique email address, etc.), if the email is not already stored in the database. *[PG]* 3. The system must allow the guest user to register by means of the Facebook authentication. *[PG]* 4. The system must allow the guest user to register by means of the Google authentication. *[PG]*	In order to be able to keep track of and register the activities of each user, the system should permit to create personal accounts, so as to allow the consultation of the personal data at any time in the future. We decided to provide the Facebook and Google authentication to permit an easy and fast registration, without the need of forcing the user to fill lots of fields with personal data.
FR2	**Events View:** 1. The system must display a list of already planned and upcoming events. *[C]* 2. The system must display events details, such as the name, date, category, place, and associated route of the event. *[C]*	In order to allow users to be informed of upcoming events and their related details, a list of already planned races will be shown to the users, who will be able to click upon the link related to a certain event, and read all the information about it in the web page in which he/she will be redirected.

FR3	**Authorization control:** 1. The system must demand to insert an authorization code to the guest who wants to access to the private area of a participant during an event (both private data and communication channel). *[C]* 2. The system must check the validity of the authorization code inserted by the spectator, comparing it to the one stored in the Database and related to the participant that the spectator decide to track. *[C]*	In order to guarantee the privacy of the participants, the system must check if the spectator who tries to access to the private area of a certain participant has been actually authorized by the participant him/herself beforehand.
FR4	**Progress Tracking:** 1. The system must allow spectators to follow the progress of all the participants, on a map. *[C]* 2. The system must allow spectators to select and see the progress of the only participants selected. *[C]* 3. The system must allow spectators to access private detailed data about a certain participant, after having checked the validity of their authorization code. *[C]*	In order to allow users to have a clear overall view of the competition, the system shows the participants as dynamic points on a real map. The spectator can decide if visualizing them all or if selecting and following just those he/she is interested in.
FR5	**Interactions:** 1. The system must allow spectators to establish a real-time communication channel with selected participants and to send to them messages during the competition, after having checked the validity of the authorization code. *[C]*	In order to provide a better tracking experience, to allow the participant to receive information about the pace of the entire competition and to permit to the supporters to encourage their athlete during a race, the enabled spectators can send text messages to the participant while he/she is competing.

ACTOR: *User*

FR6	**Login:** 1. The system must allow a registered user to login with registered email and password. *[PG]* 2. The system must allow a registered user to login with Facebook authentication, if he/she has registered with this strategy. *[PG]*	In order to allow users to access functionalities offered only to registered users. We decided to provide the Facebook and Google authentication to permit an

	3. The system must allow a registered user to login with Google authentication, if he/she has registered with this strategy. *[PG]* *4.* The system must verify if the login information are correct and already present in the Databases. *[PG]* 5. The system must allow user to logout. *[PG]*	easy and fast login, without the need of forcing the user to fill any fields with credentials, but allowing him/her to login just by clicking a button.
FR7	**Events View:** 1. The system must display a list of already planned and upcoming events. *[C]* 2. The system must display events details, such as the name, date, category, place, and associated route/s of the event*[C]*	In order to allow users to be informed of upcoming events and their related details, a list of already planned races will be shown to the users, who will be able to click upon the link related to a certain event, and read all the information about it in the web page in which he/she will be redirected.
~~FR8~~	~~**Authorization control:**~~ ~~1. The system must generate a secret random alphanumeric code (*authorization code*), whenever a participant decides to make his/her data private.~~	~~In order to guarantee the privacy of the participants, each of them must be able to freely decide if sharing his/her private area with somebody and, in that case, who he/she want to share it with. The participant can allow spectators to access to his/her private area by giving them the secret code.~~
FR9	**Event Creation and Management:** 1. The system must allow the user to create an event after the insertion of proper data, such as name of the event, date of the event, category of the event, associated route, etc. *[C]* 2. The system must store information of the event in the Database. *[C]* 3. The system must allow the user to modify information about events created by him/her. *[C]* 4. The system must allow the user to delete an event created by him/her. *[C]* 5. The system must keep information about the events updated in the Database. *[PG]* 6. The system must allow the user to open/close the registration of the participants to an event created by	In order to create an event, the event organizer must provide some basic data needed for the correct execution of all the phases of an event.

him/her. *[C]*

7. The system must allow the user to start the tracking of an event, meaning starting gathering data from participants, and stop the tracking once the the event has finished, meaning stopping gathering data from participants.*[PG]*

FR10 **Event Enrollment and Management:**

1. The system must allow a user to enroll him/herself in an event. *[C]*
2. The system must send a confirmation email after an enrollment to an event with a summary of the most important information. *[PG]*
3. The system must allow a user to delete his/her registration to an event. *[C]*
4. The system must provide multiple tracking source possibilities, each of whose can be chosen by the participants as his/her selected tracking devices. *[C]*
5. The system must allow the participants to select one tracking device from the list of those proposed. *[PG]*
6. ~~The system must allow the participants to choose if sharing their data with whoever will track the event (*public mode*), or if setting their information as private. *[C]*~~
7. The system must display the list of the events in which the user is enrolled in (future and ongoing events). *[C]*
8. The system must display a list of events in which the user has previously joined (past events). *[PG]*
9. The system must allow the user to see details about previous events in which he/she was enrolled in. *[PG]*
10. The system must allow the user to see details about upcoming events in which he/she is enrolled in. *[PG]*
11. The system must display the list of the events that the user has created (past, future and ongoing events). *[C]*
12. The system must allow the user to see details about events that the user has created (past, future and ongoing events). *[PG]*

The participant enrollment in events is one of the main functionalities of the system, whose purpose is indeed to support the events logistic. Furthermore, in order to increase the accessibility to an event, the system provides a list of several tracking devices supported, from which the participants can select the one(s) they want to be tracked with, during the competition.

FR11 **Progress Tracking:**

1. The system must gather data from all the different pre-arranged participants' tracking device(s). *[C]*
2. The system must automatically start collecting data when the organizer starts the tracking and the competition begins. *[PG]*
3. The system must allow to follow the progress of all the participants, on a map. *[C]*

In order to provide a valid tracking experience, the system must be able to collect data from several different kind of devices.
Moreover, in order to allow event organizers to have a clear overall view of the entire competition, it's

	4. The system must allow registered users to select and see the progress of the only participant selected. *[C]* 5. ~~The system must allow to access private detailed data about all the participants, if the authorization process success. [C]~~ 6. ~~The system must allow event organizer to see a page in which data about the event are shown in form of diagrams and statistics. [C]~~	possible for them to track the progresses ~~and to see private information about~~ of all the participants. ~~He/she can additionally see a dashboard with detailed statistics about the event, so as to be able to notice and quickly manage accidents and problems.~~
FR12	**Interaction:** 1. ~~The system must allow the participants to receive messages sent by authorized spectators. [PG]~~ 2. ~~The system must allow the participants to hear the messages received by means of his/her earbuds. [PG]~~ 3. The system must allow the user to easily share information about the event on Facebook. *[PG]* 4. ~~The system must allow event organizer to establish a real-time communication channel with all the participants and to send to them messages during the competition. [C]~~	~~In order to allow the participant to receive information about the pace of the entire competition, to permit to the supporters to encourage him/her during a race and to allow the event administrator to communicate with the athletes, the participant can hear messages sent by the authorized spectators while competing~~. He/she is also allowed to share post on Facebook to increase his/her visibility.
FR13	**Personal Data Management:** 1. The system must allow the registered user to modify his/her personal profile information. *[PG]* 2. The system must keep update data regarding personal profile information in the Database. *[PG]* 3. The system must allow an user to delete his/her account. *[PG]*	In order to give the possibility to users to update personal data.

ACTOR: *System Administrator*

FR14	**Login:** 1. The system must allow the system administrator to login with email and password. *[PG]*	In order to have access to the system, the system administrator must be able to login.
FR15	**Events Management:** 1. The system must display a list of all the events registered in the database. *[PG]* 2. The system must allow CRUD operations on all events	In order to manage the database when necessary, the system administrator must have access to all the

	to the system administrator. *[PG]*	CRUD operations on events.
FR16	**Users Management:** 1. The system must display a list of all the users registered in the database. *[PG]* 2. The system must allow CRUD operations on users to the system administrator. *[PG]*	In order to manage the database when necessary, the system administrator must have access to all the CRUD operations on users.

3.1.2 User Stories

FR	ID	User Story Name and Description	Priority	
	ACTOR: *Guest*			
FR1	US1	**Registration:** 1. As a guest, I want to be able to register.	High	
FR2	US2	**Event View:** 1. As a guest, I want to be able to see a list of events managed by the system, and their details.	High	
FR3, FR4	US3	**Progress Tracking:** 1. As a guest, I want to be able to see the details, such as real time progress, position, name and surname of every participants of a single event. 2. ~~As a guest, I want to be able to access to the private area of participants labeled as private, after having successfully passed an authorization process.~~	High	
FR5	US4	**Interaction:** ~~1. As a spectator, i want to be able to send messages to the participants who authorized me to do it.~~	Medium	
	ACTOR: *User*			
FR6	US5	**Login:**	High	

1. As an user I want to be able to login.
2. As an user, I want to be able to log out.

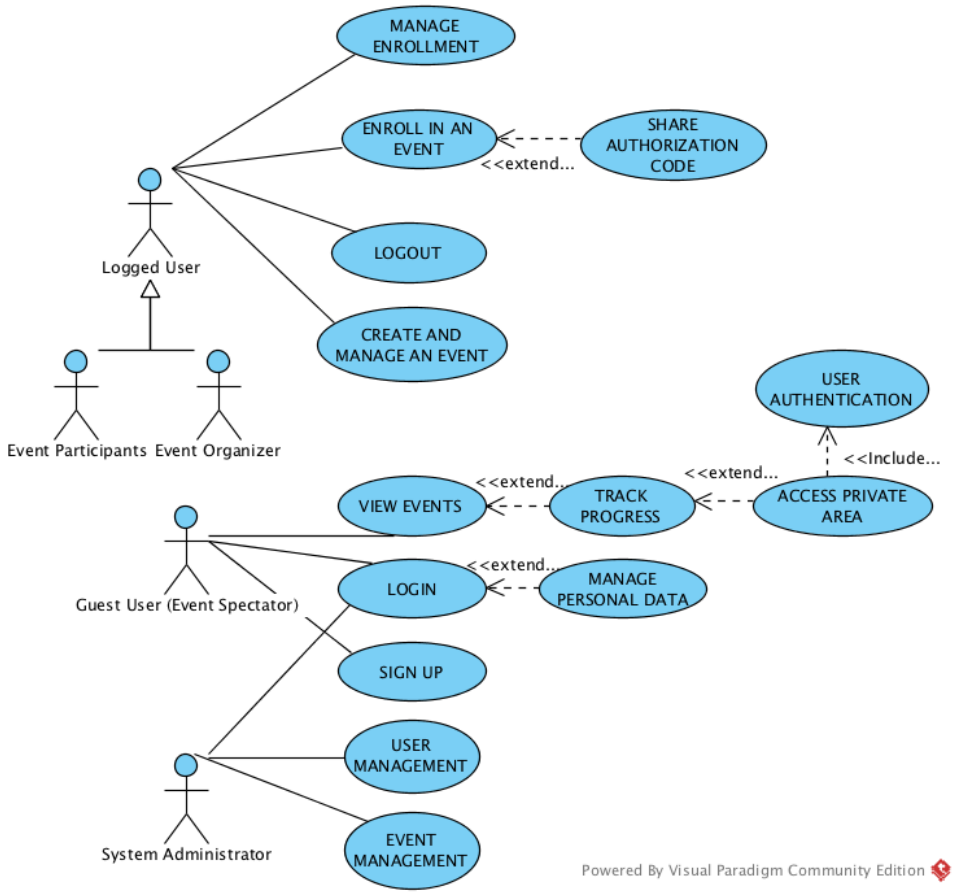
FR7	US6	**Event List:** 1. As an user, I want to be able to see the list of the scheduled events, managed by the system, and their details.	High
FR9	US7	**Event Creation and Management:** 1. As an user, I want to be able to create an event. 2. As an user, I want to be able to modify an event created by myself. 3. As an user, I want to be able to delete an event created by myself. 4. As an user, I want to be able to associate one route to an event created by myself. 5. As an user, I want to be able to open the registration phase of an event created by myself. 6. As an user, I want to be able to close the registration phase of an event created by myself. 7. As an user, I want to be able to start the tracking of an event created by myself. 8. As an user, I want to be able to stop the tracking of an event created by myself.	High
FR10	US8	**Event Enrollment and Management:** 1. As an user, I want to be able to enroll myself in an upcoming and still available event. 2. As an user, I want to be able to choose, in the events I enrolled in, the tracking device whereby I want to be tracked from those available. 3. As an user, I want to be able to cancel my enrollment in an event I previously enrolled in. 4. As an user, I want to be able to see all the events organized by me. 5. As an user, I want to be able to see the details of all the events organized by me. 6. As an user, I want to be able to see the list of events in which I'm currently enrolled in. 7. As an user, I want to be able to see the list of events in which I was enrolled in. 8. As an user, I want to be able to see the details of past events.	High

FR8 FR11	US9	**Tracking System:** 1. As an user, I want to be able to share my status and progress during the event I'm participating to. 2. ~~As an event participant, I want to be able to share more detailed data about my performance during the event with chosen spectators.~~ 3. As an user, I want to be able to see the real time progress of all the participants in an event created by myself. 4. ~~As an event organizer, I want to be able to see detailed information about all the participants who decided to provide additional information about themselves.~~ 5. As an user, I want to be able to see a page from which I can manage and see data about an event created by myself.	High
FR12	US10	**Interaction:** 1. ~~As an event organizer, i want to be able to send messages to all the participants.~~ 2. ~~As an event participant, i want to be able to receive messages from authorized spectators and listening to them by means of my earbuds.~~ 2. As an event participant, I want to be able to easily share on Facebook my real-time progress during a competition.	Medium
FR13	US11	**Personal Data Management:** 1. As an user, I want to be able to modify my personal information and data. 2. As an user, I want to be able to delete my account.	Low
		ACTOR: *System Administrator*	
FR14	US12	**Login:** 1. As a system administrator I want to be able to login. 2. As a system administrator , I want to be able to log out.	High
FR15	US13	**Events Management:**	Medium

		1. As a system administrator, I want to be able to see the list of all the events stored in the system database. 2. As a system administrator, I want to be able to create, modify, delete an event.	
FR16	US14	**User Management:** 3. As a system administrator, I want to be able to see the list of all the users stored in the system database. 4. As a system administrator, I want to be able to create, modify, delete a user account.	Medium

3.2 Use Cases

In this section it is provided an high-level overview , that displays the interaction of each actor with the system. In particular the system should distinguish two actors: the logged user and the guest user. Furthermore the logged user can be both an Event participant or an Event organizer.



3.2.1 Guest's View

ID	UC1
Name	***Registration in the system***
Description	The Guest registers him/herself in the website as an user. He/She can choose different strategy to register him/herself, such as through the email address and google or facebook authentication.
Related requirements	FR1
Actor	Guest
Basic flow	1. The Guest clicks on the Signup button of the website. 2. The system provides the relative registration form. 3. The Guest chooses the strategy of registration and completes the associated steps . 4. The system provides the relative input form. 5. The Guest inserts the requested information and creates the account. 6. The system controls the correctness of the inserted inputs. 7. The system confirms the registration and displays the homepage.

~~ID~~	~~UC2~~
~~Name~~	~~***Real time tracking of a participant during an event (Private Mode)***~~
~~Description~~	~~The Guest wants to track a participant during an event and he/she is able to access private information about him/her. This is possible only if the participant decides to share a private code with that spectator.~~
~~Related requirements~~	~~FR2, FR3, FR4~~
~~Actor~~	~~Guest, User (Participant)~~
~~Basic flow~~	~~1. The Participant shares a private code generated by the system with a certain Guest.~~ ~~2. The Guest clicks on the list of events.~~ ~~3. The Guest selects the event that he/she wants to track.~~ ~~4. The system shows the tracking page with public~~

	information about all the participants competing in the event. 5. The Guest searches for the participant he/she is interested in and he/she clicks on the participant's name, selecting him/her. 6. The system shows the real time tracking of just that Participant and the associated public information, such as name,surname and id. 7. The Guest inserts the private code received by the participant, in the correspondent field. 8. The system verifies the validity of the code and, if correct, shows additional private information about the participant, such as speed, ranking or biometric data. Moreover, the system provides the possibilities to send messages to the athlete during the race.

ID	UC3
Name	***Send a message to a participant during an event***
Assumptions	• The Guest has already received a private code from the participant and he/she is authorized to send messages to the athlete. • The Guest has already inserted the private code in the dedicated section of the website to access the private area of the participant (as specified in the previous use case).
Description	A Guest, authorized by the participant, can send motivational message to him/her, that will be reproduced by the participant's mobile application during the event.
Related requirements	FR5
Actor	Guest, User (Participant)
Basic flow	1. Guest sends a message to a participant in the private area of the website, dedicated to that participant. 2. The system reproduces the message in the participant's mobile application, through a text to speech api. 3. The Participant listens to the message while running, during the event.

3.2.2 User's View

ID	UC4
Name	***Login from the application or the Website***
Description	Each User can access both the website and the mobile application clicking on the chosen login method: email, Facebook, or Google.
Related requirements	FR6
Actor	User
Basic flow	1. The User opens the mobile application or access the login page in the website. 2. The system shows the relative login form. 3. The User selects the same access methodology that he/she chose during the registration to the website. 4. The system verifies the validity of the input received and, if the credentials are correct, returns the participant's home page on the website or the main activity on the mobile application.

ID	UC5
Name	***Enrolling to an Event***
Description	The User can select an event, whose registration period is not yet expired, and he/she can enroll to it.
Assumptions	The User has already logged in the website.
Related requirements	FR7, FR10
Actor	User
Basic flow	1. The User scrolls the list of events on the website. 2. The User chooses an event, whose registration period is already active. 3. The User selects the "Enroll button" of an event. 4. The system returns the participation form. 5. The User selects one or more tracking devices he/she wants to be tracked with, among those proposed on the page. 6. The system checks the correctness of the data. 7. The system adds the participant to the event participants

	list in the database. 8. The system sends a confirmation email to the participant just enrolled.

~~ID~~	~~UC6~~
~~Name~~	***~~Authorize a small group of spectators to access private information~~***
~~Description~~	~~The User (Participant) can send an authorization code to spectators in order to allow them to see his/her personal data and send to him/her a message~~
~~Related requirements~~	~~FR8, FR11~~
~~Actor~~	~~User (Participant)~~
~~Assumptions~~	~~The User is already logged in and previously enrolled to a certain event.~~ ~~The data of a Participant are private by default, except for his/her position, name, surname and event number.~~
~~Basic flow~~	~~1. The User selects the event in which he/she has previously enrolled.~~ ~~2. The User selects the data that he/she wants to share.~~ ~~3. The system randomly generates an authorization code.~~ ~~4. The User sends the secret code to selected spectators.~~

ID	UC7
Name	***Delete the Registration to an event***
Description	The Participant decides not to participate to an event which he/she previously joined and wants to delete his/her enrollment to the event.
Related requirements	FR10
Actor	User (Participant)
Assumption	The User is already logged in and he/she has previously enrolled to an event.
Basic flow	1. The User selects from the list of events in which he/she is

	enrolled from the section “My Events”, the event from which he/she wants to drop out. 2. The User chooses the option to delete his/her registration from that event. 3. The system updates the change in a database. 4. The User is no longer enrolled to that event.

ID	UC8
Name	***Collect tracking Data during an event***
Description	The Participant’s progress is tracked and collected with different devices.
Related requirements	FR11
Actor	User (Participant)
Basic flow	1. The User chooses which device he/she wants to be tracked with among the available ones, during the registration to an event. 2. During the event, the system monitors tracking data that are collected from the prearranged device. 3. The system can also receive data by the Participants’ mobile app. 4. The system updates constantly the Database, after a certain amount of time.

ID	UC9
Name	***Access to the dashboard***
Description	The User accesses the dashboard relative to his/her event.
Related requirements	FR9
Actor	User (Administrator)
Basic flow	1. The User opens the page of the event which he/she previously created . 2. The system shows the relative page of the event. 3. The User clicks on the button “Manage event” button. 4. The system returns the event management page with data

	collected from the database.

ID	UC10
Name	***Create an event***
Description	The User creates a new event.
Related requirements	FR9
Actor	User
Assumptions	The User is already logged in the system.
Basic flow	1. The User selects the option for creating a new event in the web application. 2. The system returns the proper input form for creating an event. 3. The User inserts proper data, such as name of the event, date of the event, category of the event, associated route/s, maximum duration, registration period for that event etc… 4. The system checks the correctness of the input received. 5. After the User confirms the creation of a new event, the system compares the input data with existing events and validates it. 6. The system stores information about the new event in the database.

4. Non-functional requirements

ID	Name and Description
NFR1	**Adaptability and extendibility:** ● A new tracking input source can be added to the system without changing anything in the architecture and organization. ● The new tracking input source can be added starting from a basic software interface.
NFR2	**Availability and recoverability:** ● The system must handle the high load that may occur during an event and be always online. ● The system must be immediately ready after a restart and/or update without any kind of configuration.
NFR3	**Deployability and configurability:** ● An administrator can install the complete system in his/her own servers without assistance of any kind. ● An administrator can run the complete system in a cloud environment from a script file.
NFR4	**Maintainability:** ● The codebase must follow widely accepted and well-documented conventions. ● Each method must be documented with a Javadoc-like comment.
NFR5	**Portability:** ● The web application must be responsive adapting the interface to different devices, from mobile phone to projector, without altering the aesthetic and usability.
NFR6	**Security:** ● The system must provide a secure storage of email, passwords and personal data. This can be achieved with secure protocols, in particular using hashing to store sensitive data such as passwords .
NFR7	**Usability:** ● The system must be extremely user friendly, meaning that the user must do few clicks in order to get the service he/she wanted to use. ● The system must automatically updates view without an explicit refresh by the user.

5. Future implementations

The team has foreseen some future implementations that could not be added during the development of the project, mainly due the limited time given, that could improve the usage of the system and improve the experience of an event.
The list below gives just an high level description of the possible improvements.

- Possibility to send additional data during the event.
- Possibility to exchange messages between spectators and participants.
- Possibility to make private the progress and the data of the participants.
- Possibility to replay an event, using different speeds, in order to see the evolution of it also after it has passed. The system has already all the data needed, because it keeps all the positions of the participants during an event.
- Possibility to track not only participants but also members of the staff. This can help the organizers during the deployment of people along the route.
- Since Google, Facebook, Whatsapp and other social services has just started to release the possibility to share the current position with friends, these live positions can be integrated into the system like a new non-conventional way to track participants.