

POLITECNICO DI MILANO

School of Industrial and Information Engineering

Computer Science and Engineering



POLITECNICO
MILANO 1863

TRACKME RASD

Requirements Analysis and Specification Document

Software Engineering 2

The project was made by

Luca Alessandrelli 846260

Andrea Caraffa 919970

Andrea Bionda 921082

Version 1.0 - 2018/2019

| | |
|-----------------------|---|
| Deliverable: | RASD |
| Title: | Requirements Analysis and Specification Document |
| Authors: | Luca Alessandrelli, Andrea Caraffa, Andrea Bionda |
| Version: | 1.0 |
| Date: | 19-October-2018 |
| Download page: | https://github.com/lucaalexandrelli/AlessandrelliCaraffaBionda.git |
| Copyright: | Copyright © 2017, Luca Alessandrelli, Andrea Caraffa, Andrea Bionda – All rights reserved |

Contents

| | |
|--|-----------|
| Table of Contents | 3 |
| List of Figures | 5 |
| List of Tables | 5 |
| 1 Introduction | 6 |
| 1.1 Purpose | 6 |
| 1.2 Scope | 6 |
| 1.2.1 Goals | 6 |
| 1.2.2 World Phenomena | 7 |
| 1.3 Definitions, Acronyms, Abbreviations | 7 |
| 1.4 Revision History | 7 |
| 1.5 Reference Documents | 7 |
| 1.6 DocumentStructure | 7 |
| 2 Overall Description | 8 |
| 2.1 Product perspective | 8 |
| 2.2 Product functions | 9 |
| 2.2.1 Data4Help - Providing data to third parties | 10 |
| 2.2.2 AutomatedSOS - Sending ambulance request in critical situation | 10 |
| 2.2.3 Track4Run - Run management | 10 |
| 2.3 User characteristics | 10 |
| 2.4 Assumptions, dependencies and constraints | 11 |
| 2.4.1 Text Assumptions | 11 |
| 2.4.2 Domain Assumptions | 12 |
| 3 Specific Requirements | 13 |
| 3.1 External Interface Requirements | 13 |
| 3.1.1 User Interfaces | 13 |
| 3.1.2 Hardware and Software Interfaces | 19 |
| 3.1.3 Communication Interfaces | 19 |
| 3.2 Scenarios | 19 |
| 3.3 Functional Requirements | 20 |
| 3.3.1 Use Case Diagram | 23 |
| 3.3.2 Use Cases | 25 |
| 3.4 Sequence Diagram | 36 |
| 3.5 Performance Requirements | 39 |
| 3.6 Design Constraints | 39 |
| 3.6.1 Standards compliance | 39 |
| 3.6.2 Hardware limitations | 39 |
| 3.7 Software System Attributes | 39 |
| 3.7.1 Reliability | 39 |
| 3.7.2 Availability | 40 |
| 3.7.3 Security | 40 |
| 3.7.4 Maintainability | 40 |
| 3.7.5 Portability | 40 |
| 4 Formal Analysis Using Alloy | 41 |

| | | |
|----------|---------------------|-----------|
| 5 | Effort Spent | 42 |
| 5.0.1 | Luca Alessandrelli | 42 |
| 5.0.2 | Andrea Caraffa | 42 |
| 5.0.3 | Andrea Bionda | 43 |
| 6 | References | 44 |

List of Figures

| | | |
|----|---|----|
| 1 | Group monitoring request | 13 |
| 2 | Individual monitoring request | 14 |
| 3 | Welcome page that the user seen in the first App access. Sign up and Sign in are two possibilities | 14 |
| 4 | Privacy policy conditions regarding Data4Help's treatment of data and group monitoring request | 14 |
| 5 | Privacy policy conditions regarding individual monitor request, the user can agree to these terms or not. | 15 |
| 6 | Message that communicates to the user the importance of ever wearing the smartwatch . | 15 |
| 7 | Main menu showing the various functions offered to user | 15 |
| 8 | Fields the user have to fill to complete the registration | 15 |
| 9 | Warning message that communicates to the user that an ambulance has been sent to the user location | 16 |
| 10 | Welcome page | 17 |
| 11 | Privacy policy conditions pt.1 | 17 |
| 12 | Privacy policy conditions pt.2 | 17 |
| 13 | Registration form | 17 |
| 14 | Main user menu | 18 |
| 15 | Promote a run view | 18 |
| 16 | Enroll to a run view | 18 |
| 17 | Spectate a run view | 18 |

List of Tables

1 Introduction

1.1 Purpose

The following Requirements Analysis and Specification Document examines a possible solution for a specific system-to-be provided by the TrackMe company. Therefore, this document contains the description of the scenarios, the use cases that described them, and the models describing requirements and specification for the system-to-be.

Data4Help is a location-based health information service-to-be that allows third parties to monitor the location and health status of individuals. The given problem is to design and develop this service and other two services, AutomatedSOS and Track4Run, which exploit the features offered by Data4Help.

AutomatedSOS is a service-to-be thought to help elderly people. Constantly monitoring the health status of the subscribed customers, this service sends to the user's location an ambulance as soon as the recorded values are anomalous, for example when some health parameters are below certain thresholds.

Finally, Track4Run is a service-to-be that tracks athletes participating in a run. The service, allows organizers to define the path for the run, participants to enroll to the run and spectators to see on a map the position of all the runners during the run.

1.2 Scope

1.2.1 Goals

- Data4Help
 - G.1 Collect users' position and health status.
 - G.2 Provide to Third Parties users' position and health status.
 - G.2.1 Provide data on-demand to non-subscribed third parties.
 - G.2.2 Provide data in real-time to subscribed third parties.
 - G.3 Allow third parties two different ways to get users' data.
 - G.3.1 Allow third parties to get data of a single person.
 - G.3.2 Allow third parties to get data of a group of people.
 - G.4 Provide data in an anonymous way, to protect users' privacy.
- AutomatedSOS
 - G.5 Retrieve user's position and health status.
 - G.6 Allow health-interested third parties the access to data detected by AutomatedSOS.
 - G.7 Monitor user's health parameters.
 - G.8 Send an ambulance to users' location whenever certain parameters are below the threshold.
- Track4Run
 - G.5 Retrieve user's position and health status.
 - G.9 Allow promoters to manage a run.
 - G.9.1 Allow promoters to define a path for the run.
 - G.9.2 Allow promoters to invite athletes to the run.
 - G.10 Allow athletes to enroll on a specific run.
 - G.11 Allow spectators to watch in real time the position of every athletes in a specific run.

1.2.2 World Phenomena

... what are world phenomena???

1.3 Definitions, Acronyms, Abbreviations

- **Definitions**

- (a) Single request: request of data from a specific registered individual.
- (b) Group request: request of data from many individuals.
- (c) Live acquisition: third parties can access to data as soon they are ready, through service updates.
- (d) On demand acquisition: third parties can access to data when they request them.
- (e) Subscribers: third parties allowed to receive live acquisition about preselected user/group.
- (f) User credentials: information that an individual has to provide to become a registered user: name, surname, date of birth, address, email, telephone number, job, marital status and fiscal code.
- (g) Third parties' credentials: information that a company has to provide to become a registered one: company name, p.iva.
- (h) Race information: all the information about the run: name, date, promoters, maximum number of participants and race path.
- (i) Private race: race that can be performed only by athletes invited by the promoter.
- (j) Public race: race that can be performed by everyone.
- (k) Partner Application: Application installed on users' device, not necessarily developed by TrackMe, that is in charge with retrieve location and health status.

1.4 Revision History

... Here you see a subsubsection

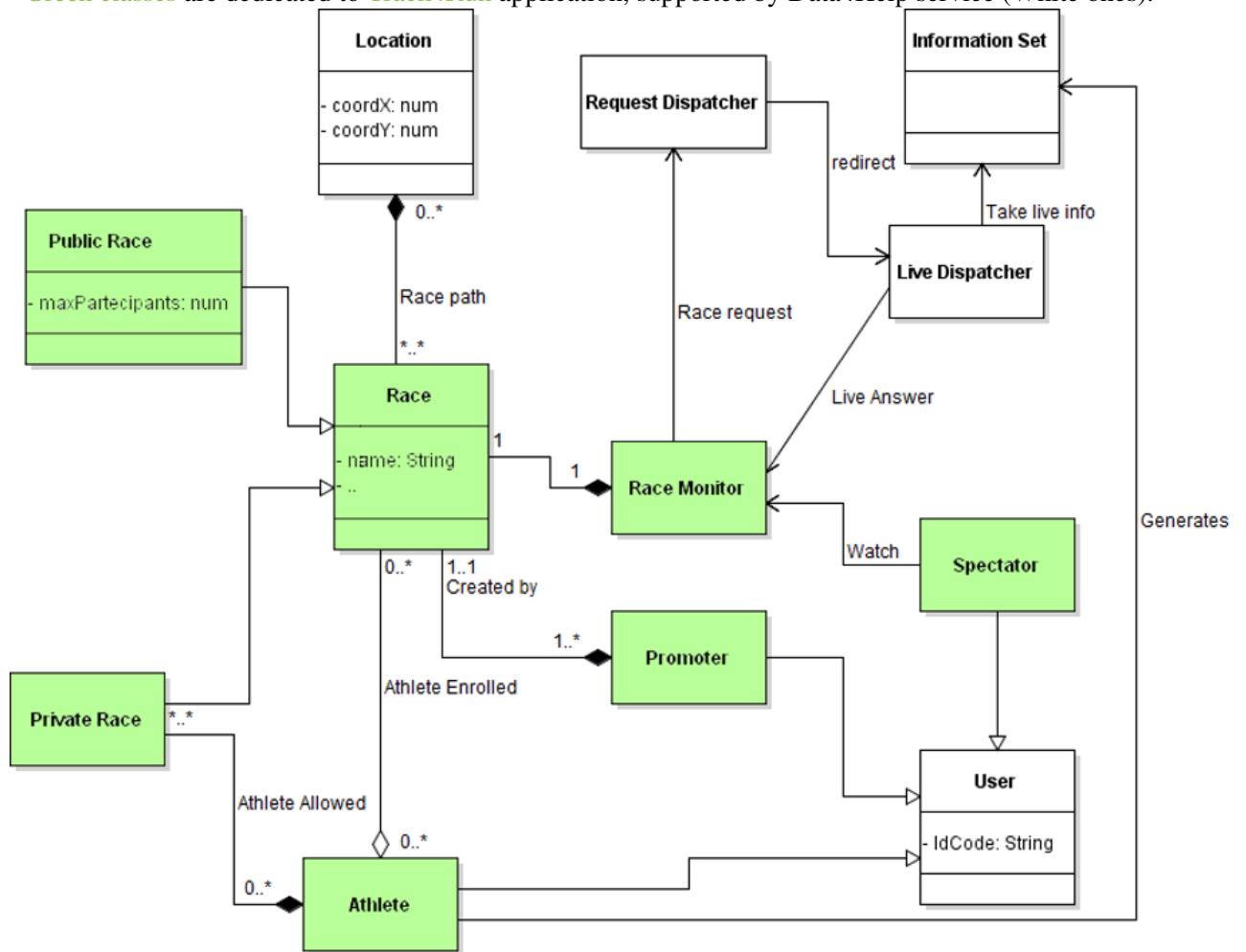
1.5 Reference Documents

... Here you see a subsubsection

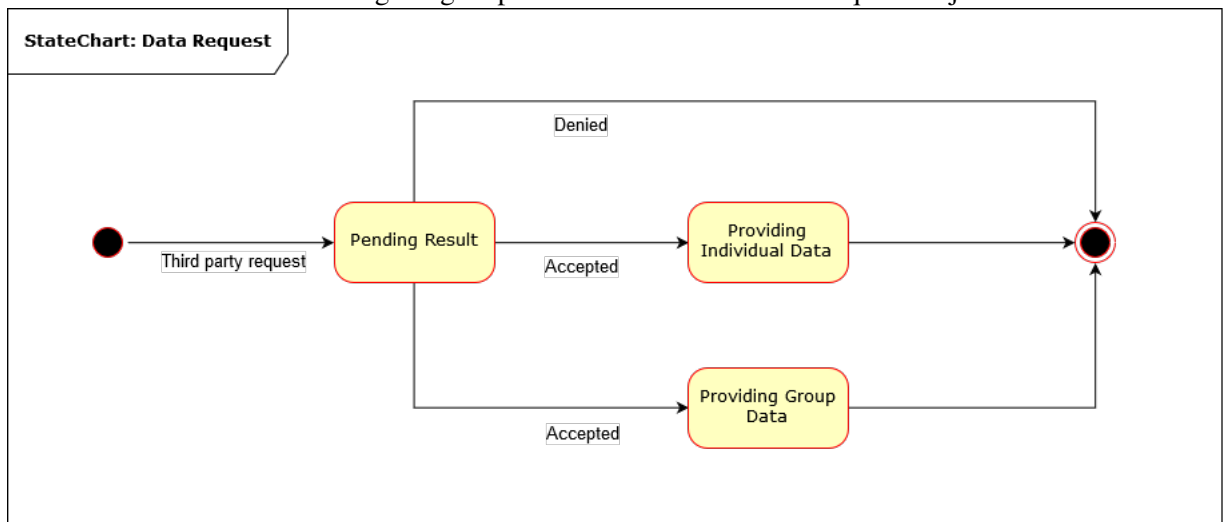
1.6 DocumentStructure

... Here you see a subsubsection

Green classes are dedicated to **Track4Run** application, supported by Data4Help service (White ones).



The following image represent the StateChart of a Request Object.



2.2 Product functions

The systems-to-be under analysis have to offer several functions. Below, the main functions provided by each system are more precisely specified, considering all the aspects emerged from the previous list of goals.

2.2.1 Data4Help - Providing data to third parties

This is the core function that Data4Help has to ensure. After collecting users position and health status information from external partner applications, Data4Help provides these data to the third party interested in having them. Data4Help provides data on demand sending to the third party all the available data about an individual (or a group of individual) collected so far. So the third party is provided with all the data about a user from the begin to now. In addition, Data4Help offers a providing data service in real time, allowing the third party to subscribe to new data and to receive them as soon as they are produced

2.2.2 AutomatedSOS - Sending ambulance request in critical situation

AutomatedSOS monitors the health status of the subscribed customers and, when such parameters are below certain threshold, sends to the location of the customer an ambulance, guaranting a reaction time of less than 5 seconds from the time parameters are below the threshold.

Therefore, the main function offered by AutomatedSOS is sending an ambulance request, with the relative user position, to the near hospital to the user. In order to optimize the times, the ambulance request contains all the data about the user health status. Providing these informations, when rescuers arrive can immediately act accordingly to the alleged anomalous data.

2.2.3 Track4Run - Run management

Track4Run offers three different functionality for its users, which can be all grouped under the 'run management' function. A user can be a promoter, in this case the user can create the event run, which will be visible to every other users. Once created a run, the promoter can define the path in a interactive way, that is by drawing the path directly on a map. Track4Run allows the promoter to set other additional information, like the start time or an overrall description of the run. Finally, the promoter can invite to the run all the participants.

The athletes have to be user too. Once received a run request, the athlete can enroll the run or reject it. In the first case, Track4Run tracks in real time the participant position for all the run through a GPS device. Therefore the athlete must wear this device, that for example can be a smartwatch

A user can also be a simple spectator and see on a map the position of all runners during the run. A spectator is also provided with the main information about the participants and with live time laps.

Both athlete and spectator users have to agree data treatment by Data4Help.

2.3 User characteristics

1. Third Party: Registered company interested in retrieve useful data from TrackMe's users. Usually this information can be useful for marketing strategy.
 - (a) Health Third Party: Non-Profit Company interested to monitor individuals in order to prevent critical diseases.
2. User: Individual that provides information about himself. His privacy must be protected by the system.
 - (a) Athlete: Track4Run's user that is enrolled in one or more race.
 - (b) Promoter: Track4Run's user that is the promoter of one or more race.
 - (c) Spectator: Track4Run's user that want follow athletes in one or more race.

2.4 Assumptions, dependencies and constraints

In the specification document certain parts were not specific and were ambiguous. So we decided to make the following assumptions.

2.4.1 Text Assumptions

- **Data4Help**

- (a) Users' information are collected from partner applications or from the other two TrackMe applications installed on users' devices.
- (b) Partner applications can be all the sport assistant apps, gps assistant apps or all the other applications that can retrieve location and health status of individual for such reason.
- (c) All the partner applications require to submit user credentials.
- (d) When the partner application is installed and credentials are submitted the user is required to accept privacy policy, composed in two parts:
 - i. The first, mandatory, user accept to be tracked in group mode.
 - ii. The second, optional, user accept to be tracked in single mode.
- (e) Individual monitoring requests are not accepted or denied one by one by the specific user. If the user agreed on the treatment of his data as information of an individual (second part of privacy policy) all Individual request by third parties are automatically accepted.
- (f) Data are collected from partner application only when they are active on users' device.
- (g) Only third parties that are registered to Data4Help can request the monitoring service.
- (h) Groups are characterized by its member's attributes (age, gender, city, etc. ...).
- (i) Health status parameters that can be acquired are all the ones supported by a standard smart-watch as: Heart Rate, Blood Pressure, Pedometer, Calories Calculation.

- **AutomatedSOS**

- (a) AutomatedSOS exploit only smartwatches devices to retrieve all the information needed.
- (b) AutomatedSOS is an application that needs to be installed into the user's device.
- (c) All data retrieved by AutomatedSOS are sent to Data4Help.
- (d) In order to keep under systematic review the user's health status all the historical information about the user are received by Data4Help's Database.
- (e) This service can be used only by elderly people (70+) or by who really need it, in order to avoid useless waste of resources.
- (f) Users can see all his personal information that are sent to the Data4Help service.

- **Track4Run**

- (a) When the user register to the application he's asked to accept or deny the treatment of his data by the Data4Help service.
- (b) The application has three functions:
 - i. Promoter: allow the user to manage a run.
 - ii. Athlete: allow the user to participate to a run. In order to be an athlete the request of data treatment by the Data4Help service need to be accepted.
 - iii. Spectator: Allow the user to watch in real time the positions of all the athletes in a given run.

- (c) Any user can organize an event.
- (d) All the events can be spectated by users.
- (e) All users invited to a run can accept or discard the request.
- (f) Race path are always composed by citizen routes (never in private circuits or stadiums)

2.4.2 Domain Assumptions

• Data4Help

- D.1 Users' information are collected from partner applications or from the other two TrackMe applications installed on users' devices.
- D.2 All the partner applications require to submit user credentials.
- D.3 The identification (fiscal code, social security number) and the secondary data (attributes) given by the individual during the registration are correct.
- D.4 Devices used to monitor individuals always report correct values.
- D.5 Partner application always report correct values to Data4Help.
- D.6 In order to perform an individual request, third parties has to know the user's fiscal code or security number.
- D.7 Security number and fiscal code are not information given to third parties by Data4Help.

• AutomatedSOS

- D.4 Devices used to monitor individuals always report correct values.
- D.9 The user always dresses a smartwatch on which AutomatedSOS is installed.
- D.10 The ambulance system is always up and ready to receive messages from AutomatedSOS.
- D.11 The ambulance successfully reach the location of the individual.
- D.12 The ambulance always get to the location in the minimum amount of time.

• Track4Run

- D.4 Devices used to monitor individuals always report correct values.
- D.13 During a run athletes always dress a smartwatch on which Track4Run is installed.
- D.14 The path defined by the organizer actually exist.
- D.16 If an athlete enroll to a run then he also participates to the run.
- D.17 All athletes have their tracking devices with them for the entire duration of the run.
- D.18 Athletes never go out of the defined path.

3 Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

- Data4Help

The third parties interested in having Location and Health Status information of individuals can made the request on the Data4Help's Website. Since the individuals do not need any particular Data4Help's App for their data retrieval, Data4Help does not offer any other user interface besides its Website. On the Website, thought for the third parties, it is possible both to made group and individual request and to view all the data provided to the specific third party.

The following mockups represent a basic idea of what the Data4Help's Website will look like in the first release.

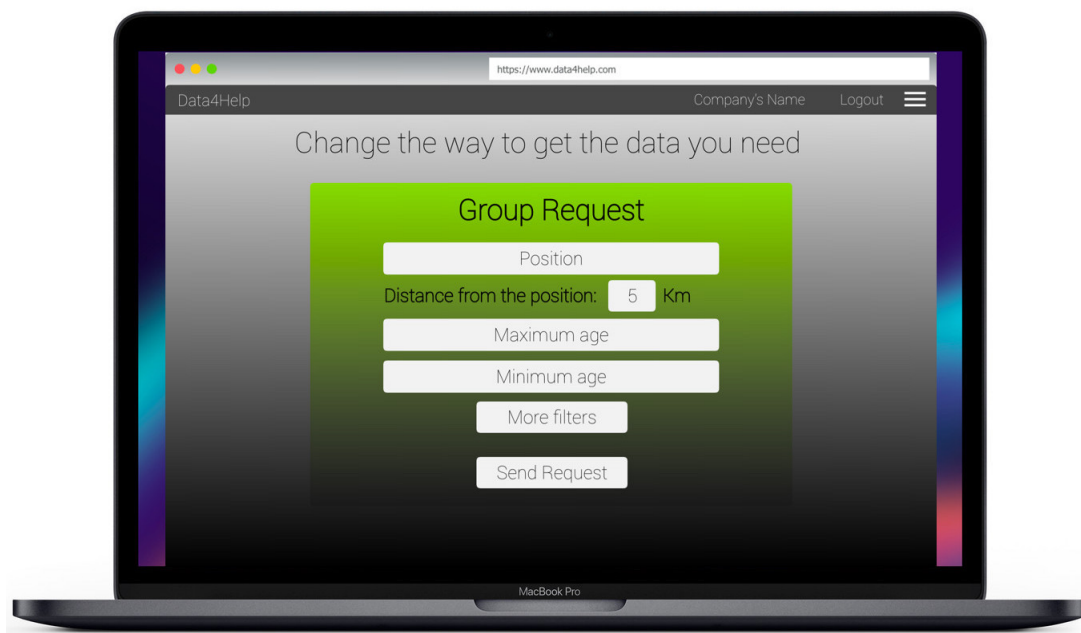


Figure 1: Group monitoring request



Figure 2: Individual monitoring request

- AutomatedSOS

TrackMe offers to AutomatedSOS users an App for smartwatches, with which the users can see their Location and Health Status information. None interface is offered to the third parties since they interact exclusively with Data4Help's Interface.

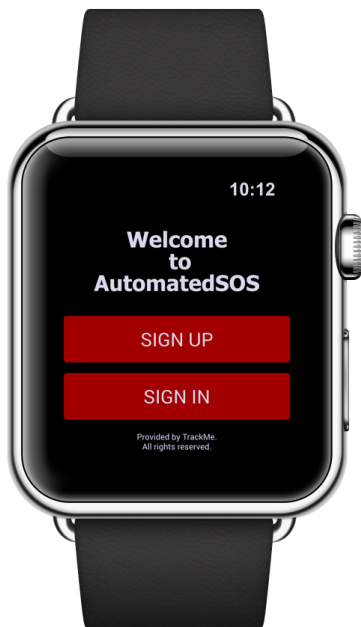


Figure 3: Welcome page that the user seen in the first App access. Sign up and Sign in are two possibilities



Figure 4: Privacy policy conditions regarding Data4Help's treatment of data and group monitoring request



Figure 5: Privacy policy conditions regarding individual minor request, the user can agree to these terms or not.



Figure 6: Message that communicates to the user the importance of ever wearing the smartwatch



Figure 7: Main menu showing the various functions offered to user



Figure 8: Fields the user have to fill to complete the registration



Figure 9: Warning message that communicates to the user that an ambulance has been sent to the user location

- Track4Run

Track4Run users can use an App for smartphone and another one for smartwatches. The first one could be used by everyone, while the second one is made only for the athletes. Like for AutomatedSOS, there is not any interface provided for the third parties.

The mockups showed in the next page represent a basic idea of what the Track4Run's App for smartphone will look like in the first release.

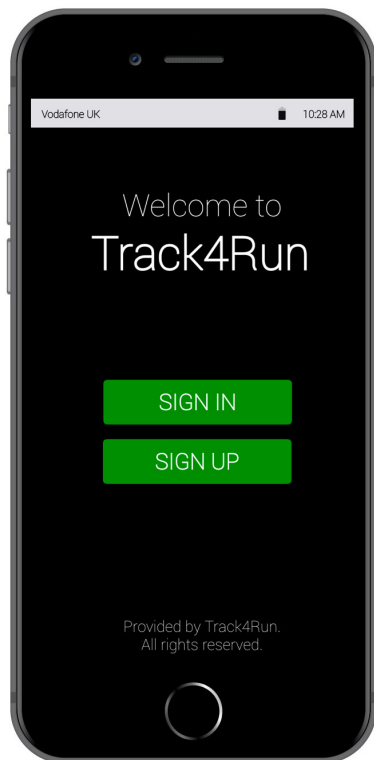


Figure 10: Welcome page

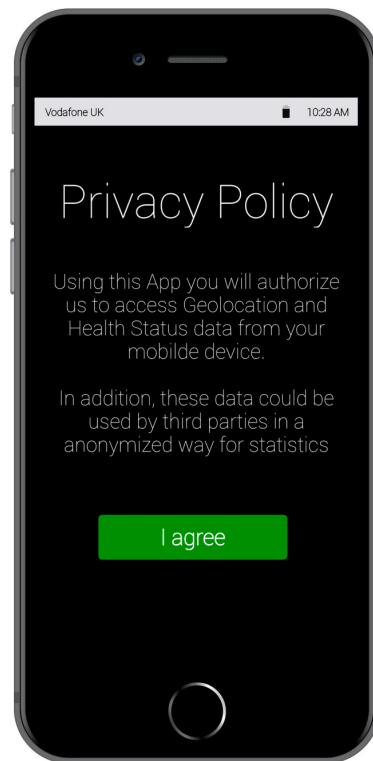


Figure 11: Privacy policy conditions pt.1



Figure 12: Privacy policy conditions pt.2

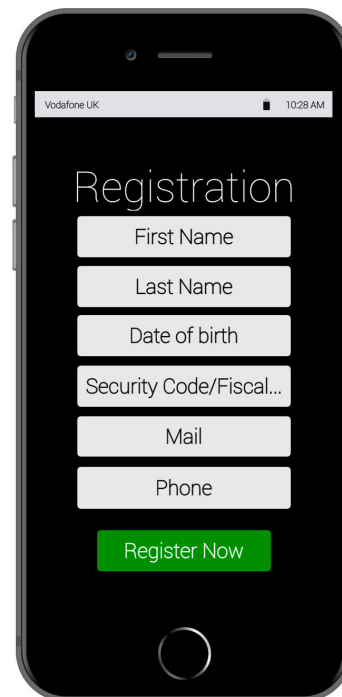


Figure 13: Registration form

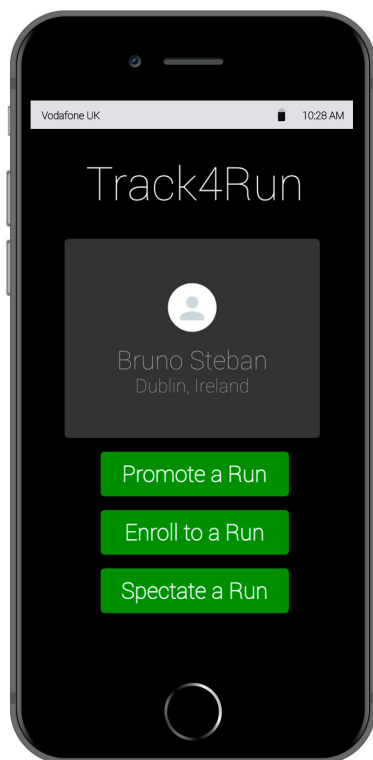


Figure 14: Main user menu

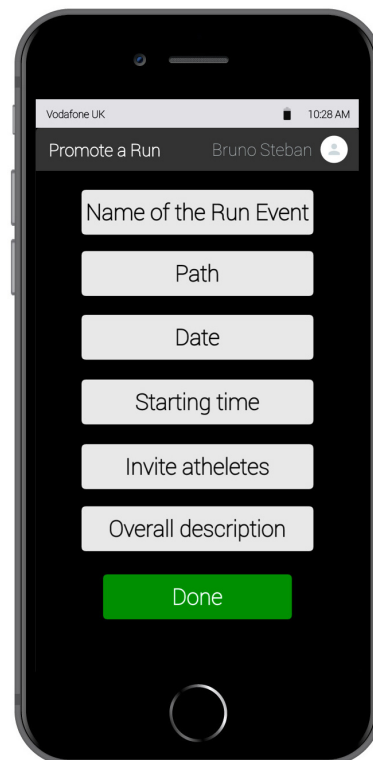


Figure 15: Promote a run view

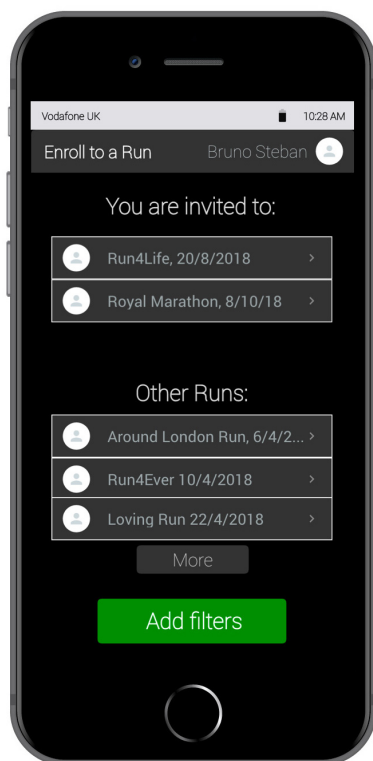


Figure 16: Enroll to a run view

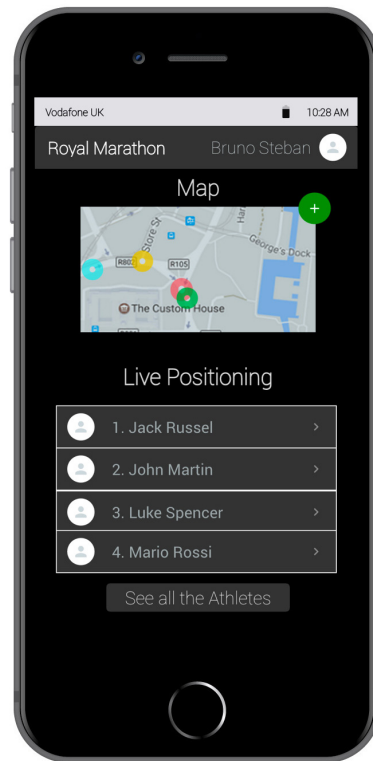


Figure 17: Spectate a run view

3.1.2 Hardware and Software Interfaces

None of the three services-to-be offer any hardware or software interfaces to external world.

3.1.3 Communication Interfaces

3.2 Scenarios

- **Scenario 1**

The company StatisticsDispenser is interested into weekly providing public statistics about people living in London. For this reason the company, which is already registered to Data4Help, need to send a group monitoring request. After logging into the Data4Help website, StatisticsDispenser open the group request section. The website loads a new page where the company can filter groups through some attributes regarding his members like the age, the gender, the city and many more. For the specific purpose StatisticsDispenser chooses only to filter people who live in London and people who's age is between 20 and 60. Then, due to the fact that the company need future data, StatisticsDispenser subscribes to the group. From now on every time new data is available the system sends a notification to StatisticsDispenser.

- **Scenario 2**

Mark often goes for a run so he decides to download an app to track his progress. The app he installed on his smartphone is a Partner Application with Data4Help. After he registers to this app he's asked if he wants to give his information to the company TrackMe and also if he wants his data to be treated also as individual data. Right after he accepts the policy he's asked to create a Data4Help account or to link an existing one to the application. Mark never created a Data4Help account so he decides to go through the registration process. He fills all the attributes fields required for the sign up and confirm the registration. Data4Help creates the account and saves all the attributes that Mark filled in. Data4Help is now ready to receive Mark's data from the partner application.

- **Scenario 3**

Bob is 77 years old and lately he's having heart problems. Under his son's advice he decided to use the AutomatedSOS application to receive immediate aid in case of need. One month later Bob doesn't feel okay and his heartbeat value goes below the threshold. AutomatedSOS recognizes that Bob is in a critical health state and quickly sends a report to First Aid system containing useful information like his current location and the reason he's in danger. After the First Aid system received the report, it immediately sends an ambulance to Bob's location and then sends an acknowledge message to AutomatedSOS. The application shows a message on Bob's device to let him know that an ambulance is coming for aid.

- **Scenario 4**

Mario promotes run events for a living so in order to simplify the process he goes through everyday he decides to download Track4Run on his smartphone. The famous company AdiDas designate Mario to promote a run that takes place once a year in Milan. Mario log into the app and enter the "Promote a Run" section, inserts and confirms all the information needed. Track4Run creates the run and makes it available to athletes to enroll in.

- **Scenario 5**

Lately Eddie and his friends are bored of what they usually do so they decided to participate to a different activity. More precisely they want to create a run event using Track4Run App and see who's the fastest at running. Unfortunately Eddie got ill the day before the event but he's just too curios of seeing who of his friends is going to win. For this reason as soon as the run starts he logs

into Track4Run and enters the "Spectate a Run" section and select the run created with his friends. A few moments later the map appears on the app with all the athletes positions on it letting Eddie see how the run is proceeding in real time.

3.3 Functional Requirements

- Data4Help

- G.1 Collect users' position and health status.**

- D.1 Users' information are collected from partner applications or from the other two TrackMe applications installed on users' devices.
 - D.2 All the partner applications require to submit user credentials.
 - D.3 The identification (fiscal code, social security number) and the secondary data (attributes) given by the individual during the registration are correct.
 - R.1 Retrieve user credentials inserted into partner application as group attributes.
 - R.2 Allow users already registered in Data4Help world to sign in with his account without provide user credentials again.
 - R.3 Allow individuals to agree with privacy policy (first part). Registered users, now, can be tracked in group mode request through installed application.
 - R.4 Allow individuals to specify, during registration, if they are also interested to be tracked in single mode request (second part) through installed application.
 - R.5 After registration the system provides, through provided e-mail, the password to access the data.
 - D.4 Devices used to monitor individuals always work and report the correct values.
 - D.5 Partner application always report correct values to Data4Help.
 - R.6 The system has to correctly receive data from partner applications installed on users' device.

- G.2 Provide to Third Parties, the users' position and health status.**

- R.7 Allow third parties registration to Data4Help service, where they have to specify all their credentials.
 - R.8 For each user registered, the system has to automatically retrieve and store data from partner applications with a resolution of 10 minutes; independently from the requests reached.
 - R.5 After registration the system provides, through provided e-mail, the password to access the data.

- G.2.1 Provide data on-demand to non-subscribed third parties.**

- R.9 The system has to collect inside his database all the useful information that match the request.
 - R.10 The system has to send to applicant all the data already collected.

- G.2.2 Provide data in real-time to subscribed third parties.**

- R.11 Allow third parties subscription to interested group in order to receive live data.
 - R.13 Provide to subscribed third parties data as soon as they are available by the system.

- G.3 Allow third parties two different ways to get users' data.**

- G.3.1 Allow third parties to get data of a single person.**

- D.6 In order to perform an individual request, third parties has to know the user's fiscal code or security number.

D.7 Security number and fiscal code are not information given to third parties by Data4Help.

R.14 Allow third parties to insert fiscal code of user that want to track.

R.15 Deny third parties to receive information about users in single mode, that have not accepted second part of privacy policy.

R.16 Collect all the useful information retrieved by Data4Help that are produced by the interested users

R.17 Send all the collected information to request applicant.

G.3.2 Allow third parties to get data of a group of people.

R.18 Allow third parties to insert search area and attributes in which they are interested to restrict their field of search.

R.19 Deny third parties to receive information if the provided information can hurt users' privacy, for this purpose group request under 1000 users involved are rejected.

R.16 Collect all the useful information retrieved by Data4Help that are produced by the interested users

R.17 Send all the collected information to request applicant.

G.4 Provide data in an anonymous way, to protect users' privacy.

R.15 Deny third parties to receive information about users in single mode, that have not accepted second part of privacy policy.

R.19 Deny third parties to receive information if the provided information can hurt users' privacy, for this purpose group request under 1000 users involved are rejected.

• **AutomatedSOS**

G.5 Retrieve user's position and health status.

R.20 Allow users to be tracked from AutomatedSOS filling up the registration and agreeing to privacy policy.

D.4 Devices used to monitor individuals always report correct values.

D.9 The user always dresses a smartwatch on which AutomatedSOS is installed.

R.21 The application has to interact with Smartwatch/Smartphone APIs in order to retrieve location and health status.

R.22 The application is able to send to Data4Help service all the informations already retrieved in live acquisition.

G.6 Allow health-interested third parties the access to data detected by AutomatedSOS.

R.23 Allow non-profit organizations to register into AutoatedSOS portal and becoming health third parties.

R.24 Allow health third parties to receive informations about all the users registered to AutomatedSOS through Live Acquisition performed by Data4Help.

G.7 Monitor user's health parameters.

R.21 The application has to interact with Smartwatch/Smartphone APIs in order to retrieve location and health status.

R.25 The application has to retrieve users' health status every 2 seconds in order to guarantee reaction time of 5 seconds.

G.8 Send an ambulance to users' location whenever certain parameters are below the threshold.

R.26 The application has to control health status with data retrieved in local to realize immediately if certain parameters are critical.

- R.27 The application has to call an ambulance, if parameters are critical.
- D.10 The ambulance system is always up and ready to receive messages from AutomatedSOS.
- R.28 Supply to hospital user's location and all the useful information to provide efficient first aid.
- R.29 If none answer arrives from the hospital the software must repeat another time the request until an answer is reached.
- D.11 The ambulance successfully reach the location of the individual.

• Track4Run

G.5 Retrieve user's position and health status.

- R.20 Allow users to be tracked from Track4Run filling up the registration and agreeing to privacy policy.
- D.4 Devices used to monitor individuals always report correct values.
- R.21 The application has to interact with Smartwatch/Smartphone APIs in order to retrieve location and health status.
- R.22 The application is able to send to Data4Help service all the informations already retrieved in live acquisition.

G.9 Allow promoters to manage a run.

- R.31 Allow users to create a run providing all the general information about the competition.
- R.32 Allow users to specify if the race is public or private.
- D.4 Devices used to monitor individuals always report correct values.
- D.13 During a run athletes always dress a smartwatch on which Track4Run is installed.

G.9.1 Allow promoters to define a path for the run.

- R.33 Allow promoters to define a path for the race by selecting the routes inside a map.
- D.14 The path defined by the organizer actually exist.

G.9.2 Allow promoters to invite athletes to the run.

- R.34 Allow promoters to invite athlete to be runner of their private race.
- R.35 Allow promoters to specify maximum number of athletes that can take part to their public race.

G.10 Allow athletes to enroll on a specific run.

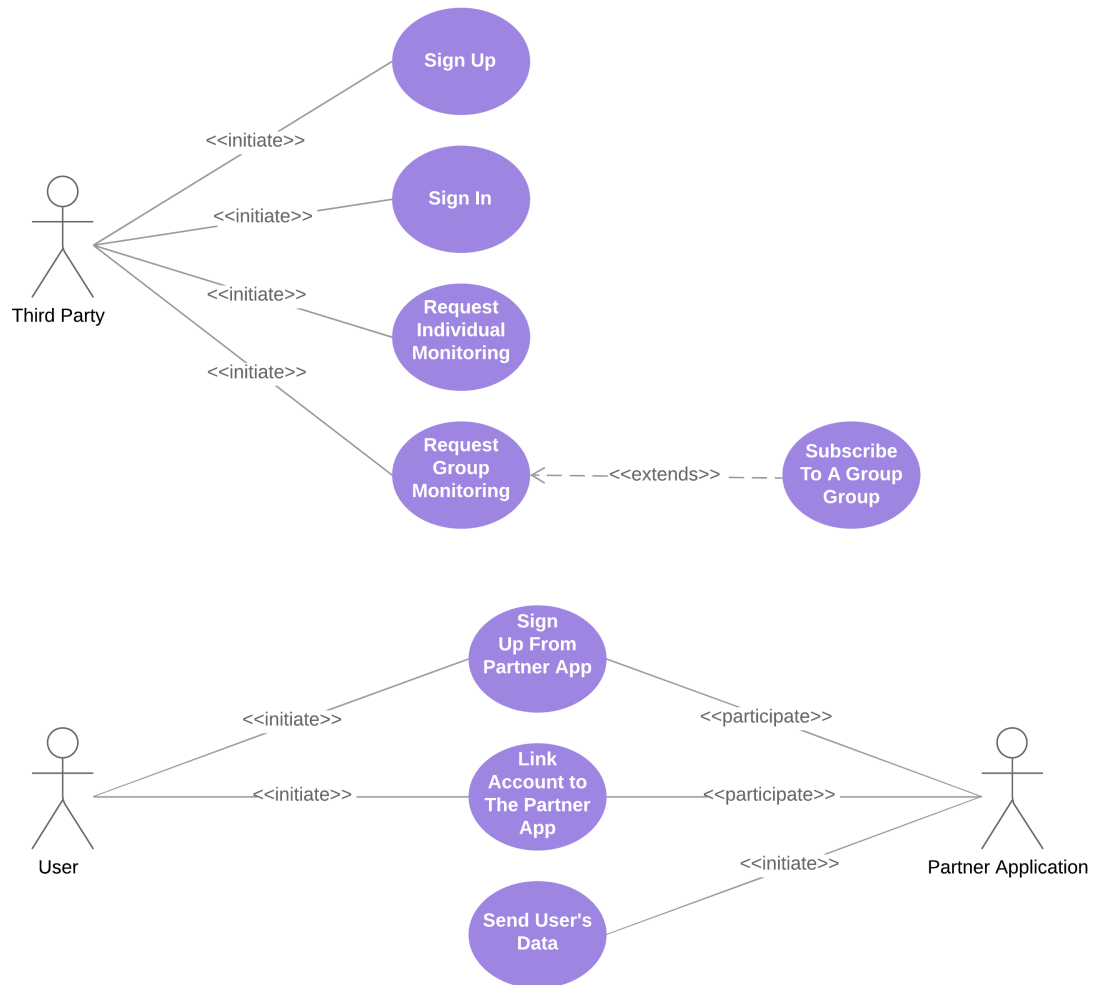
- R.36 Allow users to see all the public races and private races in which he is invited.
- R.37 Allow user to select a race and add him to the athletes involved.
- D.16 If an athlete enroll to a run then he also participates to the run.

G.11 Allow spectators to watch in real time the position of every athletes in a specific run.

- D.17 All athletes have their tracking devices with them and the application enabled for the entire duration of the run.
- R.38 Allow user to select a race to be viewed.
- R.39 The application must be able to request to Data4Help the positions of all the other athletes involved.
- R.40 The application must be able to receive and display the positions of all the other athletes involved.
- D.18 Athletes never go out of the defined path.

3.3.1 Use Case Diagram

- Data4Help



- AutomatedSOS



- Track4Run



3.3.2 Use Cases

- Data4Help Use Cases

| | |
|------------------|---|
| Name | Sign Up |
| Actors | Third Party |
| Entry Conditions | TRUE |
| Event Flow | <ul style="list-style-type: none">(a) The Third Party enters the sign up section.(b) The system shows to the third party all the attributes fields needed for the registration.(c) The Third Party fills all the attribute fields.(d) The Third Party confirms all the attributes inserted stating he wants to register.(e) The system creates and saves the third party's account. |
| Exit Condition | The third party's account has been created and the third party is now registered. |
| Exceptions | <ul style="list-style-type: none">• If the system notices that the attributes used in the registration are already linked to an existing account then a warning is generated saying that there is already a third party registered with the given attributes. |

| | |
|------------------|--|
| Name | Sign In |
| Actors | Third Party |
| Entry Conditions | TRUE |
| Event Flow | <ul style="list-style-type: none">(a) The Third Party enters the sign in section.(b) The system shows to the third party all the credentials fields needed for the log in.(c) The Third Party fills all credentials fields and confirms he wants to log in.(d) The system accepts the log in request. |
| Exit Condition | The third party is now logged in. |
| Exceptions | <ul style="list-style-type: none">• If the third party inserts invalid log in credentials a warning is generated saying the credentials are invalid. |

| | |
|------------------|---|
| Name | Request Individual Monitoring |
| Actors | Third Party |
| Entry Conditions | The third party is logged in. |
| Event Flow | <ul style="list-style-type: none"> (a) The Third Party enters the Individual Request section. (b) The system shows to the third party all the information fields needed for the identification of the individual. (c) The Third Party fills all the attribute fields and confirms he wants to track that specific individual. (d) The system shows all the individual's information that have been collected until the moment of the request. |
| Exit Condition | The request's outcome is shown to the third party. |
| Exceptions | <ul style="list-style-type: none"> • If the inserted attributes are not linked to any user account then a warning message is displayed saying that the individual is not registered. • If the individual that correspond to the attributes inserted didn't accept the individual treatment of data policy then a warning message is displayed saying that the request is rejected. |

| | |
|----------------------|---|
| Name | Request Group Monitoring |
| Actors | Third Party |
| Entry Conditions | The third party is logged in. |
| Event Flow | <ul style="list-style-type: none"> (a) The Third Party enters the Group Request section. (b) The system shows to the third party all the information fields needed for defining the group. (c) The Third Party inserts all the attributes. (d) The Third Party insert the search area. (e) The system accepts the request. (f) The system shows all the group's information that have been collected until the moment of the request. |
| Exit Condition | The request's outcome is shown. |
| Exceptions | <ul style="list-style-type: none"> • If the group request get rejected by the system a warning message will be displayed saying the request is rejected. |
| Special Requirements | The system rejects group monitoring requests when the group's information can compromise users' privacy. For this purpose requests of groups composed by less than 1000 users get rejected. |

| | |
|------------------|---|
| Name | Subscribe To A Group |
| Actors | Third Party |
| Entry Conditions | The third party has just sent an accepted monitoring request to a group. |
| Event Flow | <ul style="list-style-type: none"> (a) The Third Party requests to follow the selected group. (b) The system links the third party to the group. (c) The system sends new data to the third party. |
| Exit Condition | The Third Party is subscribed to the selected group. |
| Exceptions | <ul style="list-style-type: none"> • If the third party is already subscribed a warning message is shown saying the subscription have been already done. |

| | |
|------------------|---|
| Name | Sign Up From Partner App |
| Actors | User, Partner Application |
| Entry Conditions | The user accepted the treatment of data policy. |
| Event Flow | <ul style="list-style-type: none"> (a) The user starts the sign up function on the partner app. (b) The Partner Application shows to the user all the attributes fields needed for the registration. (c) The User fills all the attribute fields. (d) The Partner Application sends to the system the attributes inserted by the user. (e) The system receives by the partner application all the attributes inserted by the user. (f) The system creates the user's account and saves the received data. |
| Exit Condition | The system registered the user. |
| Exceptions | <ul style="list-style-type: none"> • If the system notices that attributes used in the registration are already linked to an existing account then a message is sent back to the partner application in order to let the user know what happened. |

| | |
|------------------|---|
| Name | Link Account To The Partner App |
| Actors | User, Partner Application |
| Entry Conditions | The user accepted the treatment of data policy and already has an existing account to link to the partner application. |
| Event Flow | <ul style="list-style-type: none"> (a) The user starts the account linking function on the partner app. (b) The Partner Application shows to the user all the credential fields needed for the linking process. (c) The User fills all the credential fields. (d) The Partner Application sends to the system the credentials inserted by the user. (e) The system receives by the partner application all the credentials inserted by the user. (f) The system sends back to the partner application the outcome of the operation. |
| Exit Condition | The system registered the user. |
| Exceptions | <ul style="list-style-type: none"> • If the system notices that the credentials received are not linked to an existing account then a message is sent back to the partner application in order to let the user know what happened. |

| | |
|------------------|---|
| Name | Send User's Data |
| Actors | User, Partner Application |
| Entry Conditions | The user accepted the treatment of data policy and the partner application is running on the user's device. |
| Event Flow | <ul style="list-style-type: none"> (a) The Partner Application collects user's data. (b) The Partner Application sends the user's data to the the system. (c) The system receives and saves the user's data sent by the partner application. |
| Exit Condition | The system saved the user's data. |
| Exceptions | None |

• AutomatedSOS Use Cases

| | |
|------------------|---|
| Name | Sign Up |
| Actors | User |
| Entry Conditions | The User has AutomatedSOS installed on his smartwatch. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters the sign up section of the app. (b) The User accepts the treatment of data policy. (c) The system shows to the user all the attributes fields needed for the registration. (d) The User fills all the attribute fields. (e) The User confirms all the attributes inserted stating he wants to register. (f) The system creates and saves the user's account. |
| Exit Condition | The user's account has been created and the user is now registered. |
| Exceptions | <ul style="list-style-type: none"> • If the User does not accept the treatment of data policy then a warning is generated saying that ,in order to register, the policy must be accepted. • If the system notices that attributes used in the registration are already linked to an existing account then a warning is generated saying that there is already an individual registered with the given credentials. |

| | |
|------------------|---|
| Name | Sign In |
| Actors | User |
| Entry Conditions | The User has AutomatedSOS application installed on his smartwatch. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters the sign in section of the app. (b) The system shows to the user all the credentials fields needed for the log in. (c) The User fills all credentials fields and confirms he wants to log in. (d) The User clicks the "Enter" button. (e) The system accept the log in request. |
| Exit Condition | The User user is now logged in. |
| Exceptions | <ul style="list-style-type: none"> • If user inserts invalid log in credentials a warning is generated saying the credentials are invalid. |

| | |
|------------------|---|
| Name | See Acquired Data |
| Actors | User |
| Entry Conditions | The User is logged in. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters the Acquired Info section of the app. (b) The system gets all the user's information that have been retrieved by the application until that moment. (c) The system displays the user's information. |
| Exit Condition | All the information retrieved by the system are shown on the app. |
| Exceptions | <ul style="list-style-type: none"> • If the system do not find information about the user then a warning message is shown to the user saying that until now the application did not record any information. |

| | |
|------------------|--|
| Name | Set Preferences |
| Actors | User |
| Entry Conditions | The User is logged in. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters the Preferences section of the application. (b) The User can add or remove certain health parameters in order to personalize the monitoring profile. (c) The User can also change certain parameters threshold. (d) The User confirms all the changes done. (e) The system saves all the changes made by the user. |
| Exit Condition | The parameters are correctly updated as the user wants them to be. |
| Exceptions | <ul style="list-style-type: none"> • If the user does not confirm the changes then all parameters remain the same as before. |

| | |
|----------------------|---|
| Name | Send Ambulance Request |
| Actors | AutomatedSOS, First Aid |
| Entry Conditions | A critical health parameter value is below the threshold. |
| Event Flow | <ul style="list-style-type: none"> (a) AutomatedSOS sends to First Aid a report that contains all important information about the user like his current location, his gender, his age, his health profile, and the list of parameters that got below the threshold. (b) First Aid immediately sends an ambulance to the user's location. (c) First Aid sends an acknowledge message to AutomatedSOS. (d) AutomatedSOS displays on the app a warning message saying that an ambulance is currently heading to the user's location. |
| Exit Condition | A warning message is shown saying that an ambulance is currently heading to the user's location. |
| Exceptions | <ul style="list-style-type: none"> • If no acknowledge message is received by AutomatedSOS after the form has been sent, as soon as a certain time out expires AutomatedSOS re-send the form with updated information. |
| Special Requirements | The form need to be sent to First Aid with a reaction time of less than 5 seconds from the time the parameters are below the threshold. |

• Track4Run Use Cases

| | |
|------------------|---|
| Name | Sign Up |
| Actors | User |
| Entry Conditions | The User has Track4Run application installed on his device. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters the sign up section of the app. (b) The User accepts the treatment of data policy. (c) The system shows to the user all the attributes fields needed for the registration. (d) The User fills all the attribute fields. (e) The User confirms all the attributes inserted stating he wants to register. (f) The system creates and saves the user's account. |
| Exit Condition | The user's account has been created and the user is now registered. |
| Exceptions | <ul style="list-style-type: none"> • If the User does not accept the treatment of data policy then a warning is generated saying that ,in order to register, the policy must be accepted. • If the system notices that attributes used in the registration are already linked to an existing account then a warning is generated saying that there is already an individual registered with the given credentials. |

| | |
|------------------|---|
| Name | Sign In |
| Actors | User |
| Entry Conditions | The User has Track4Run application installed on his smartwatch. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters the sign in section of the app. (b) The system shows to the user all the credentials fields needed for the log in. (c) The User fills all credentials fields and confirms he wants to log in. (d) The User clicks the "Enter" button. (e) The system accepts the log in in request. |
| Exit Condition | The User user is now logged in. |
| Exceptions | <ul style="list-style-type: none"> • If the user inserts invalid log in credentials a warning is generated saying the credentials are invalid. |

| | |
|------------------|--|
| Name | Promote A Run |
| Actors | User |
| Entry Conditions | The User is logged in. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters the Promote a Run section of the app. (b) The system shows to the user a new tab where the user can define all the important information about the run and also invite athletes. (c) The system creates and saves the run's information. (d) The system automatically sends notifications to all athletes specified by the promoter asking them if they want to participate to the run. |
| Exit Condition | The run event has been created and added to the list of promoted runs. |
| Exceptions | <ul style="list-style-type: none"> • If the user does not insert critical information (like the path, the name or the date) a warning message is shown saying that critical parameters are missing. |

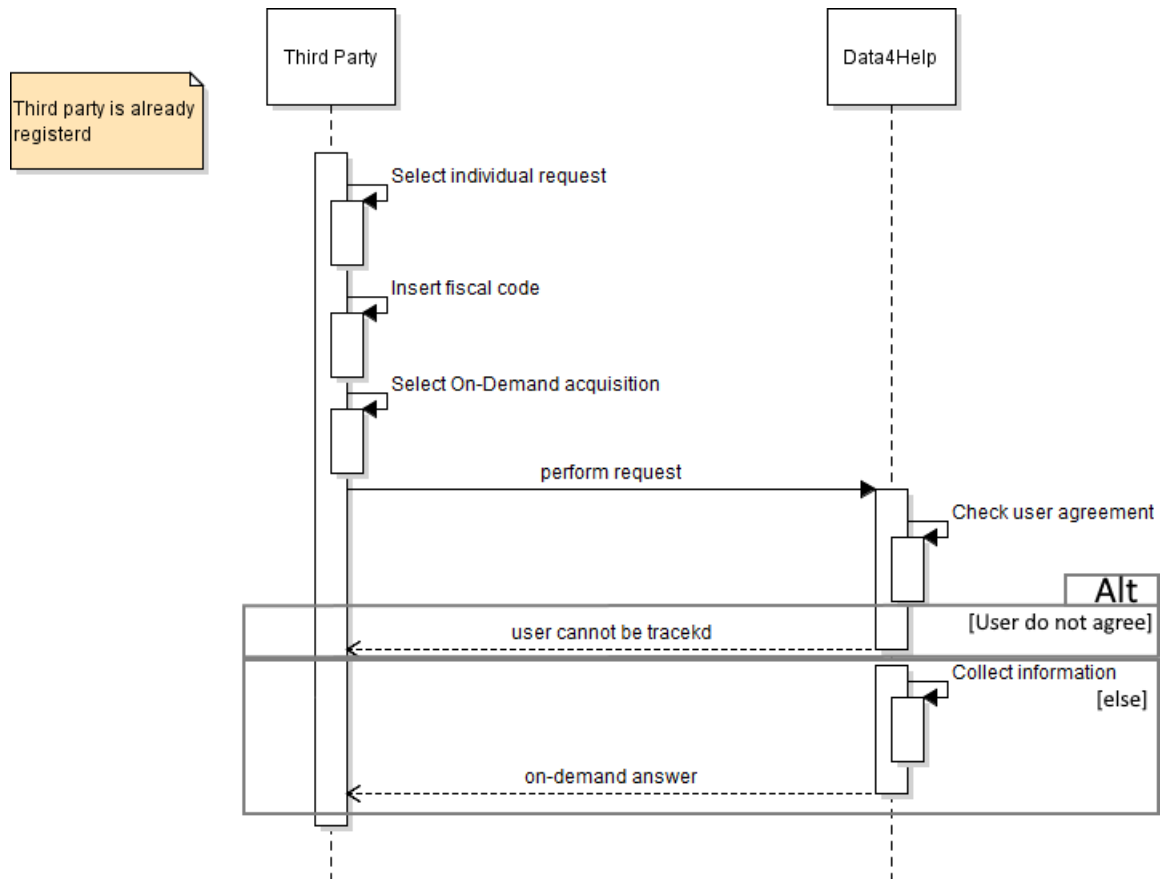
| | |
|------------------|--|
| Name | Enroll To A Run |
| Actors | User |
| Entry Conditions | The User is logged in. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters to the "Enroll to a Run" section of the app. (b) The system shows to the user the list of all the created runs that will take place in the future. (c) The User can filter the runs with some attributes. (d) The User chooses the run he wants to participate to. (e) The system adds the user to the list of athletes enrolled to the run. |
| Exit Condition | The user is now enrolled to the run. |
| Exceptions | <ul style="list-style-type: none"> • If the number of athletes has already capped the max amount in the run chosen by the user then a warning message is displayed saying that no more athletes are allowed to participate to the run. • If the user didn't accept the treatment of data policy, a warning message is displayed, asking the user to accept it in order to enroll to the run. |

| | |
|------------------|---|
| Name | Spectate A Run |
| Actors | User |
| Entry Conditions | The User is logged in. |
| Event Flow | <ul style="list-style-type: none"> (a) The User enters the Spectate a Run section of the app. (b) The system shows a new tab where the list of all live runs is visible. (c) The User can filter the runs with some attributes. (d) The User chooses the run he wants to spectate. (e) The system shows to the user the map of the run and also the position of all athletes in real time. |
| Exit Condition | The system is showing to the user the map and the athletes positions. |
| Exceptions | None. |

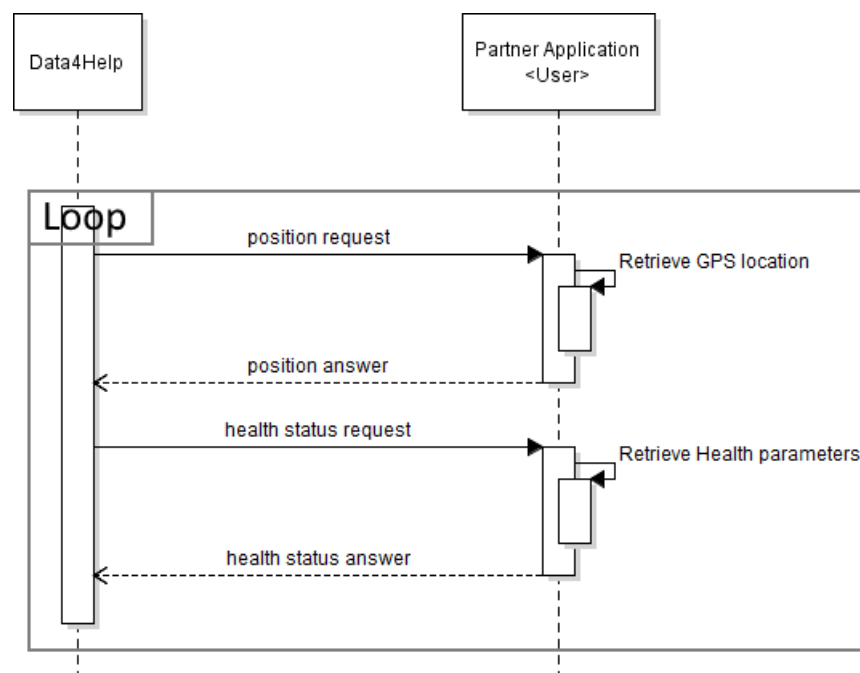
3.4 Sequence Diagram

- Data4Help

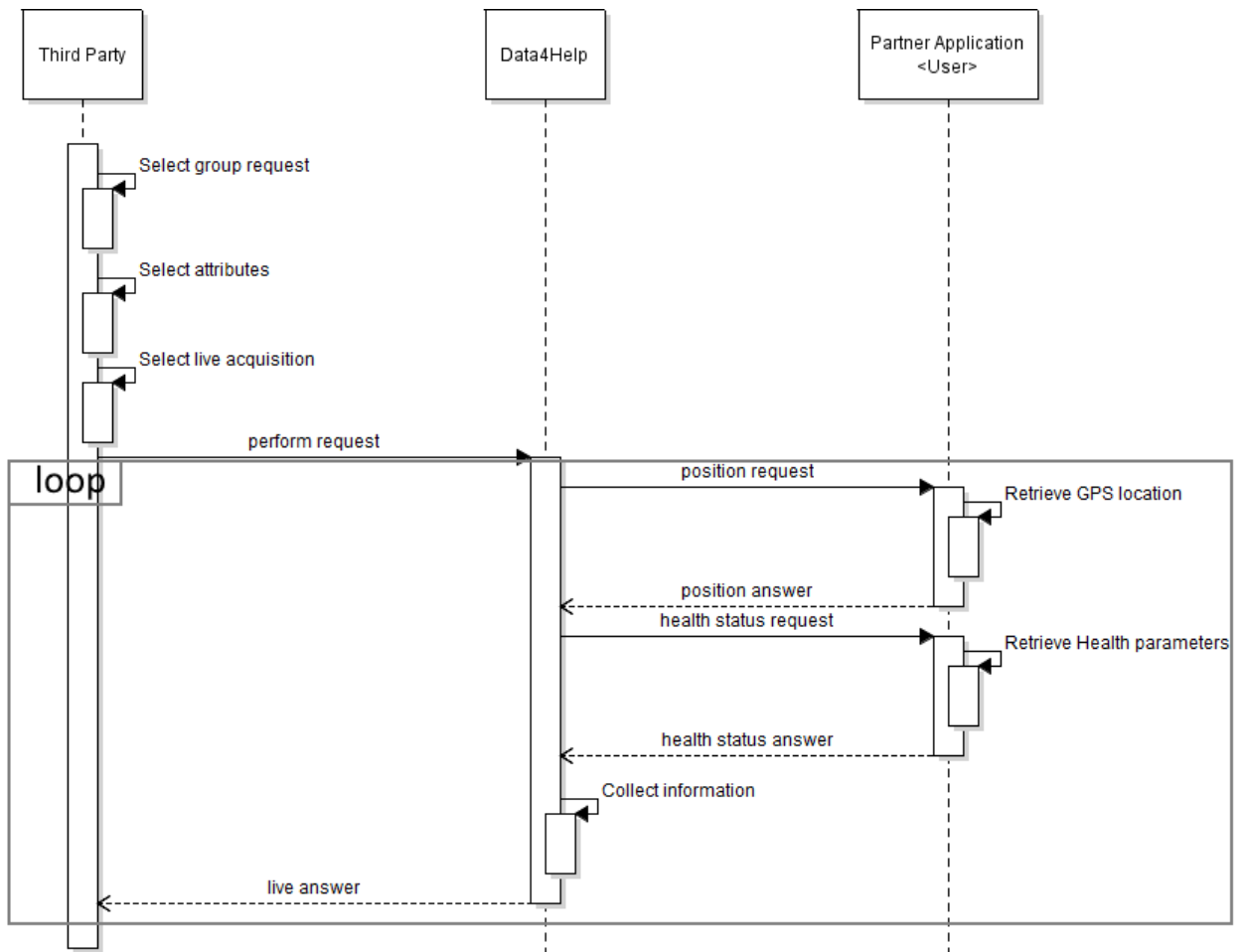
Individual request with on-demand acquisition performance.



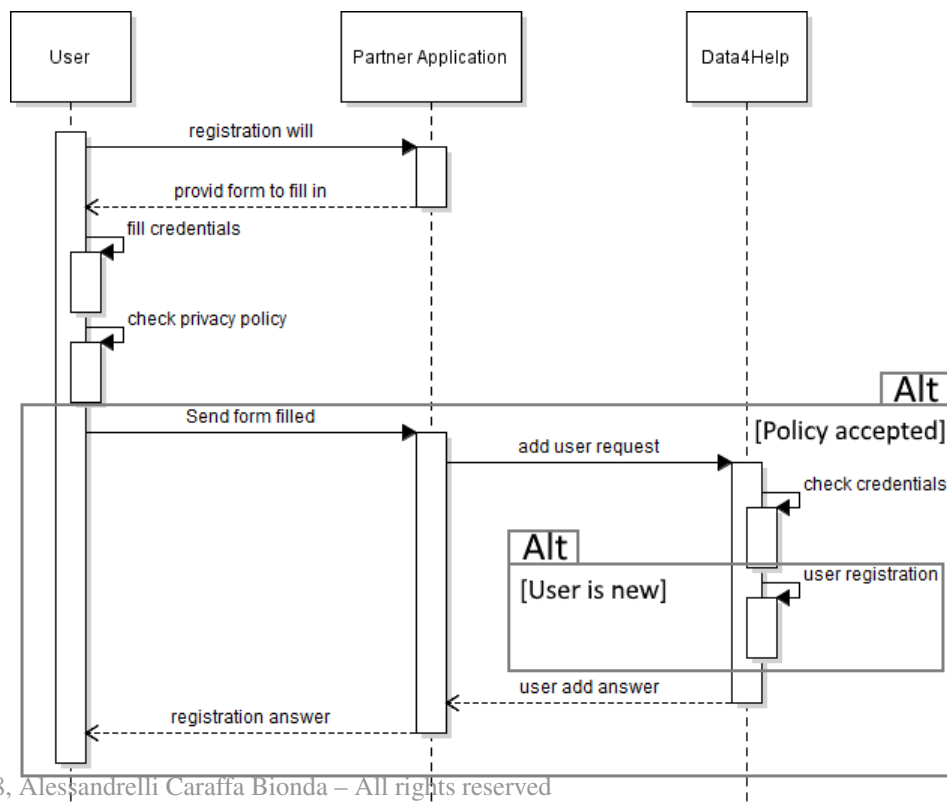
Automatic data update inside Data4Help:



Group request with live acquisition performance:

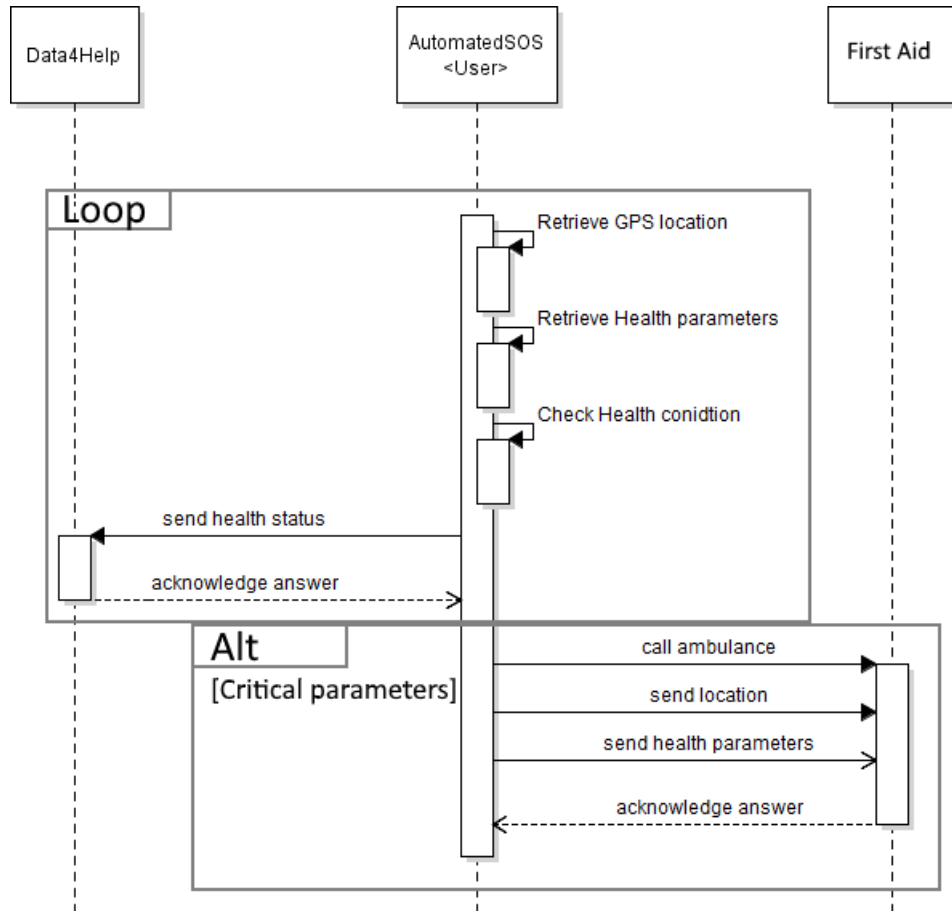


User registration performance:



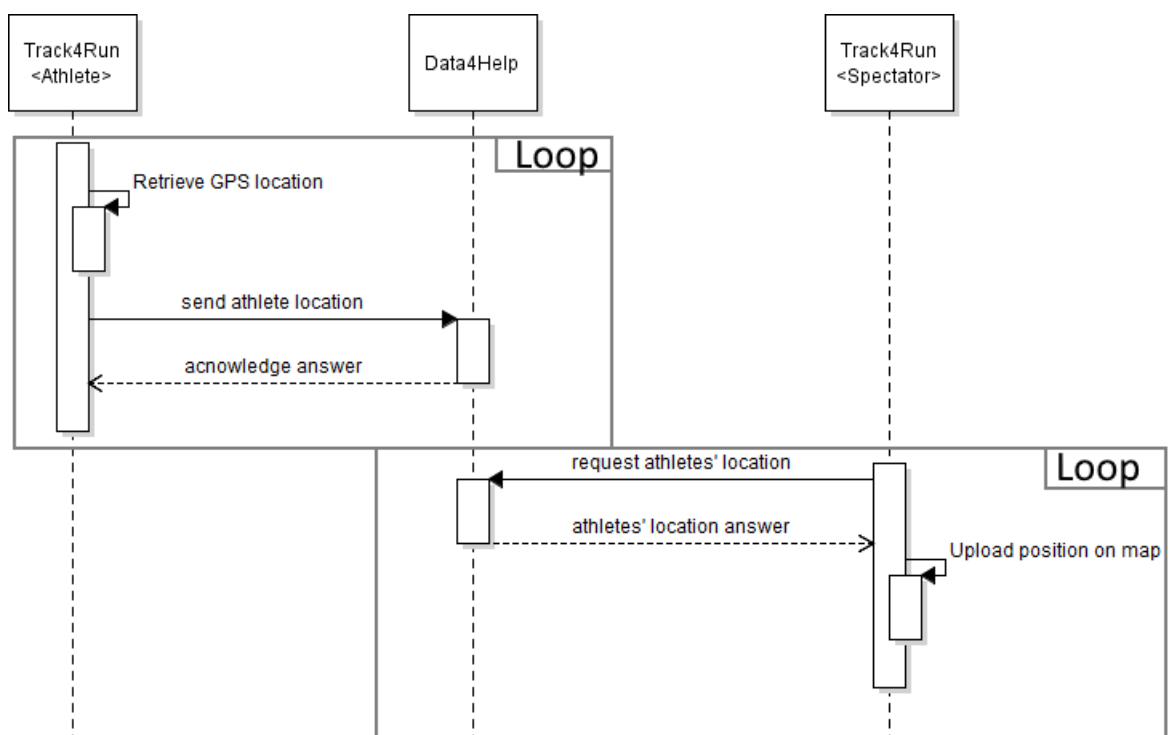
- AutomatedSOS

AutomatedSOS monitor and ambulance caller services:



- Track4Run

Track4Run automated retrieve athletes' position and update spectators' live map.



3.5 Performance Requirements

- Data4Help service is build to perform trend research from users that download specific partner applications, in order to perform this type of monitoring there is a high use of resources (specially in live acquisition when data must be exchanged within 2 minutes) therefore ,initially, this application is developed to track 10.000 users simultaneously (included users from AutomateSOS and Track4Run). To serve third parties is required less performance because they are very few in comparison to users.
- AutomatedSOS is a very expensive application in terms of performance because it must monitor the individual all the day and guarantee a data collection with an interval of 2 seconds.
- Track4Run is a variable expensive application because it has to monitor individual constantly during the race, but not all day, all the athletes have a run.

3.6 Design Constraints

3.6.1 Standards compliance

- Partner applications request the permission to retrieve location and health status to the device, same for AutomateSOS and Track4Run.
- Data4Help requires that partner applications can use internet connection and users' mobile data to exchange information.
- AutomatedSOS requires all day internet connection in order to call an ambulance every time is needed.
- AutomatedSOS requires internet connection during all the duration of the race to the athletes and to the spectator.

3.6.2 Hardware limitations

- AutomatedSOS application requires that is installed on a smartwatch (smartphone is not enough) in order to acquire location and health status.
- Track4Run application requires that is installed on a smartphone (or a smartwatch) in order to acquire location.
- Smartphone and smartwatch must be iOS or Android platform.
- The devices must have internet connection (mobile data are mandatory).
- The devices must have GPS locator.
- Smartwatch must have Heart Rate monitor, Blood Pressure monitor, Pedometer, Calories Calculator.

3.7 Software System Attributes

3.7.1 Reliability

Data4Help service,clearly, has some moments with less load (as the night) but is important to guarantee a 24/7 service. Some small concessions are possible during the night. In order to guarantee Automat-

edSOS monitoring this service must be available 24/7, also the night. Track4Run service has the same consideration of Data4Help.

3.7.2 Availability

In order to guarantee high degree of availability, and considering that the main core of the service are data, is necessary high level of data redundancy about. This system is expected to be available 99.99

3.7.3 Security

Security for sensitive informations are one of the goal of this system, in order to guarantee users' privacy, the system implements certificated security communication protocol. In any cases users can read and agree regulatory policy first.

3.7.4 Maintainability

In order to guarantee maintainability the entire software project is based on Data4Help primitives (as data request, exchange and classification) that must be developed with accuracy and certificated. By using or extending fundamental primitives is possible to construct incremental and interchangeable blocks that can be used to perform all the other services requested.

3.7.5 Portability

Data4Help service can be reached by third parties from http request, so every browser can be perform request and retrieve users' data. AutomatedSOS and Track4Run applications are developed as multi platform technology so either iOS or Android devices can run these two apps. (remember that AutomateSOS requires Smartwatch device).

4 Formal Analysis Using Alloy

Organize this section according to the rules defined in the project description.

5 Effort Spent

In this section contains information about how much hours each group member spent in working at this document.

5.0.1 Luca Alessandrelli

| Date | Task | Hours |
|--------------------|--------------------|-------|
| 18/10/18 | Goals | 1 |
| 19/10/18 | Domain Assumptions | 3 |
| 20/10/18 | Text Assumptions | 3 |
| 24/10/18 | Text Assumptions | 1 |
| 24/10/18 | Domain Assumptions | 1 |
| 30/10/18 | Text Assumptions | 0.5 |
| 30/10/17 | Domain Assumptions | 0.5 |
| 30/10/18 | State Chart | 1.5 |
| 4/11/18 | Goals | 2 |
| 4/11/18 | Text Assumptions | 2 |
| 4/11/18 | Domain Assumptions | 2 |
| 5/11/18 | State Chart | 1.5 |
| 5/11/18 | Use Case | 4 |
| 6/11/18 | Use Case | 3 |
| 6/11/18 | Use Case Diagram | 3 |
| 7/11/18 | Use Case | 1.5 |
| 7/11/18 | Use Case Diagram | 1 |
| 8/11/18 | Use Case | 2 |
| 8/11/18 | Use Case Diagrams | 0.5 |
| 8/11/18 | Scenarios | 0.5 |
| 9/11/18 | Scenarios | 1 |
| Text Assumptions | | 6.5 |
| Goals | | 3 |
| Domain Assumptions | | 6.5 |
| State Chart | | 3 |
| Scenarios | | 1.5 |
| Use Case | | 10.5 |
| Use Case Diagram | | 4.5 |
| Alloy | | / |
| Total | | 35.5 |

5.0.2 Andrea Caraffa

| Date | Task | Hours |
|----------|-------|-------|
| 18/10/18 | | |
| 19/10/18 | | |
| | Total | |

5.0.3 Andrea Bionda

| Date | Task | Hours |
|----------|-------|-------|
| 18/10/18 | | |
| 19/10/18 | | |
| | Total | |

6 References