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**POLITECNICO**  
MILANO 1863

# **Requirement Analysis and Specification Document**

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# 1 Introduction

## 1.1 Purpose

The purpose of this document is to give a detailed specification for the TrackMe software product. Along the following pages the goals, requirements, constraints and interfaces of the project will be explained. The intention of this document is not only to be proposed to the customer but to be used as the ground for the development of the product.

This document could be used as a contractual basis for the realisation of the project.

## 1.2 Scope

TrackMe enhances the flowing of data from the users to the clients, enabling the companies to make right choices about their users thanks to the analysis of the data. These data may encompass location, heart rate, age and so. The data needs to be recollected in a time basis, allowing the clients to analyse their evolution trough the time.

The recollection of the data should be carried out in an automated fashion, using the sensors available in mobile devices such as mobiles (smartphones) and smart-watches.

Such automation should not undermine the privacy rights of the users. The system should provide mechanism for the users to grant or deny their approval for the recollection and treatment of their data.

The main goal of the system is to provide tools for the analysis of the recollected data. Therefore, the system should provide a dashboard and an API to the clients, allowing them to navigate and query the available data.

The goals of the system are summarised in table 1.

ID	Goal
GL1	The system should provide registration
GL2	The system should store data recollected from different sensors of the mobile devices of the user.
GL3	The system should recollect the data from the users at time intervals.
GL4	The system should store and display the data in a time series format, allowing the client to consult the changes in the parameters along the time.
GL5	The system should allow the clients to easily query the already recollected data of the users.
GL6	The system should allow the clients to query the data of an specific user.
GL7	The system should allow the clients to subscribe to a query, providing new data as arrives.
GL8	The system should protect the privacy of the users. A data batch displayed to a client should not enable the differentiation between individuals.
GL9	The system should allow users to monitor some of their parameters, alerting the emergency system when any of these parameter gets out of a threshold.

Table 1: Goals

## 1.3 Definitions, acronyms and abbreviations

### 1.3.1 Definitions

- **Administrator:** Worker of TrackMe with access to the entire platform without restrictions.
- **Client:** Individual or company that pays TrackMe to get access to the data of the users of TrackMe.
- **User:** Individual that installs the TrackMe application and give TrackMe permission to collect and sell their personal data.
- **Data batch:** Collection of data from different users that comply with a query based on parameters made by a client.
- **Emergency system:**
- **Parameter:** Type of data in which the recollected data is organised. These parameters may include blood pressure, location
- **Payment system:**

### 1.3.2 Acronyms

- **API:** Application program interface.

### 1.3.3 Abbreviations

## 1.4 Revision history

## 1.5 Reference Documents

## 1.6 Document Structure

# 2 Overall Description

## 2.1 Product perspective

The recollection of the data will be carried out by the mobile devices of the users, upon installation of the application of TrackMe. Before the recollection of data takes place, the users have to register to the system and give their approval.

To enable the analysis of the data to the clients, TrackMe provides centralised tools by means of an online dashboard and an API endpoint. The latter is intended to facilitate the integration of TrackMe platform with client's ones.

The payment of the clients for accessing the data is handle by a third party system and integrated in TrackMe. The request of ambulances is performed by a third party service, presumably an public service offered by the government.

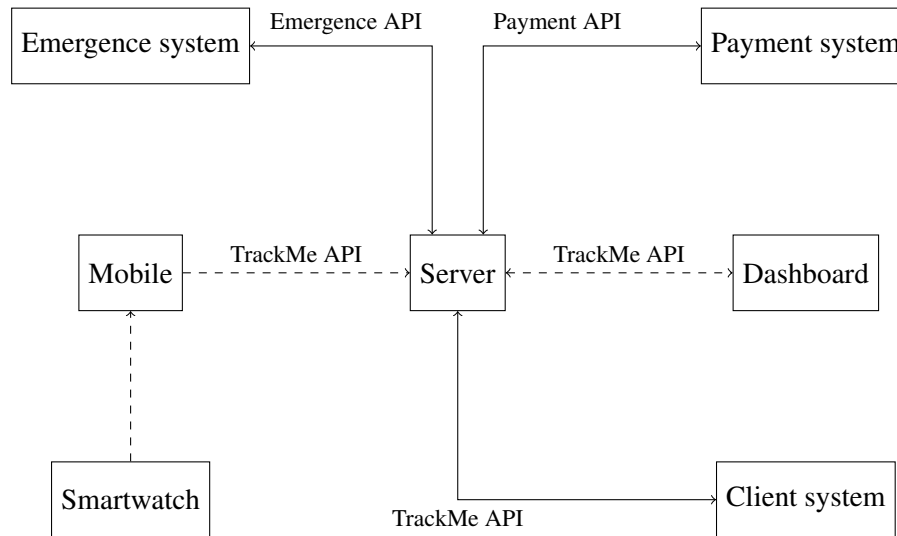


Figure 1: Overview of the system

An overview of the system is shown in figure 1. The dashed lines represents connections between elements of the TrackMe system while the solid ones corresponds to outside ones. These connections are discussed more profoundly in section ??.

## 2.2 Product functions

The main functions of the product are detailed below. The requirements stated later pursue the implementation of these functions.

### 2.2.1 Recollection of users' data

The related goals are GL1, GL2 and GL3.

The recollection of the users' data will be carried out by the users' devices<sup>1</sup> and stored by the server of TrackMe. The data will be grouped by parameters. The parameters will be defined in the technical requirements (section 2.4.2).

An important distinction has to be made between fixed parameters and temporary ones. The former includes data that not changes, like the birth of date, codice fiscale, name, residence and so on. The latter will be recollected at a fixed interval of time and stored with a time-stamp associated with them. Location and heart rate are in this group.

This function is the cornerstone of the entire system, as the rest of the functionalities are devoted to consuming the recollected data.

### 2.2.2 Querying data

The related goals are GL4, GL5, GL6, GL8 and GL8.

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<sup>1</sup>i.e. smartwatch and smartphone

The data stored in the server will be available to the clients. The system should allow clients to build a query based on the available parameters. This query will return a data batch<sup>2</sup>.

The clients will be provided with two ways of accessing the data. The first one will be by mean of an online dashboard<sup>3</sup> and an API.

The latter is intended to erase the interconnection between the system of the client and the TrackMe one. Because of this, the API functionalities will be limited to querying data.

No matter what way the client use, two access of the data should be distinguish:

- **Anonymous query:** Query that return a data batch with enough entries to be considered anonymous, i.e. not individuals can be distinguish.
- **Individual query:** Query by an identifier related univocally to an user. The client must elicit the permission of the user before getting the data.

This distinction is tightly related to goals GL6 and GL8. The related goal is GL9.

The charge to the clients for the access will be by means of a subscription.

### 2.2.3 Ambulance service (AutomatedSOS)

AutomatedSOS is an extra service offered to the users. The system will monitor a set of parameters further detailed in 2.4.2. When some of these parameters goes out of a threshold predefined by TrackMe, an alarm will be raised to the Emergency System, attaching the location of the user.

The aforementioned alarm will be communicated to the Emergency System by electronic means, using an API offered by the Emergency System.

## 2.3 User characteristics

There are three different types of actors in the system. Their definitions can be found in 1.3.1. Through these sections, each type will be analysed and an attempt of characterising them based on demographics will be made.

### 2.3.1 Users

The potential users can be segmented by age:

- **Generation Z:**
- **Millennials:** Born between 1980 and 2000's, the so-called *digital natives* are very confident in their abilities with digital interfaces and are used to fast-paced interactions.[1]. They read less than the average user [1], which leads to a rapid acceptance of the terms of usage of any application.
- **Generation X:** Born between 1980 and 1960. According to [2], 85% of *Gen Xers* owns a smartphone, which makes this generation a good segment for TrackMe product. They are generally influenced by convenient purposes and will keep aside digital products [3] if they do not feel comfortable with them.

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<sup>2</sup>See data batch definition on 1.3.1

<sup>3</sup>i.e. a web page



- **Baby boomers:** Born between 1946 and 1964. The market segment of *Boomers* is very interesting since they have a great acquisition power. However, the penetration of fitness tracking devices are very scarce in this demographic interval. In fact, *Boomers* usually found difficulties in using the health monitor devices [4].

Niños: Personas comprendidas entre los 10 y los 18, estos usuarios conocen el uso de las aplicaciones móviles y no presentan problemas en su uso, por su temprana edad necesitan mejores explicaciones de todo lo presente para su entendimiento.

## 2.4 Assumptions, dependencies and constrains

### 2.4.1 Assumptions

- The location given by the user is correct at every moment.
- The user use real data.
- The user has a continuous and correct internet connection.
- The user gives permission to the app for the different services.
- The user that is using the smart-watch or the mobile phone is the user that is log in.

### 2.4.2 Constraints

:

- The international and Italian regulation about the use of data by third parties.
- The user has smart-watch and phone powered by Android.

### 3 Specific Requirements

#### 3.1 External Interface Requirements

#### 3.2 User Interfaces

#### 3.3 Hardware Interfaces

Specify the logical characteristics of each interface between the software product and the hardware elements of the system. This includes configuration characteristics (number of ports, instruction sets, etc.). It also covers such matters as what devices are to be supported, how they are to be supported, and protocols. For example, terminal support may specify full-screen support as opposed to line-by-line support.

#### 3.4 Functional Requirements

Specify all of the software requirements to a level of detail sufficient to enable designers to design a software system to satisfy those requirements.

Specify all of the software requirements to a level of detail sufficient to enable testers to test that the software system satisfies those requirements. At a minimum, describe every input (stimulus) into the software system, every output (response) from the software system, and all functions performed by the software system in response to an input or in support of an output.

The specific requirements should:

- Be stated in conformance with all the characteristics described in subclause 5.2 of this International Standard.
- Be cross-referenced to earlier documents that relate.
- Be uniquely identifiable

The functional requirements are divided in three categories. The requirements of the user application, table 2; the requirements related with clients, table 3 and 4, and finally the AutomatedSOS requirements, table 6.

ID	Goal	Description
FR1	GL1	When an user opens the application and no login had been performed, the system shall show the welcome page.
FR2	GL1	When the welcome page is shown, the system shall show two buttons. When clicked, one of them shall redirect to the login page and the other to the registration page.
FR3	GL1	When the registration page is completed, the system shall show the terms and conditions page and only users that accept the terms and conditions will successfully registered.
FR4	GL2	When the user logs in for the first time in the application, the application shall check what sensors are available an issue an Android Permission Request for each of them.
FR5	GL2	If the user declines an ► Android Permission Request ◄, the application shall issue again an Android Permission Request for the same sensor.
FR6	GL2 GL3	The system shall poll ► each 5 minutes ◄ the available sensors in the background and send the value of each sensor to the server using the interface. ► intref ◄
FR7	GL6	► Cuando recibe una solicitud de permiso para tracking individual, mostrarselo al user. ◄

Table 2: Functional requirements of user application

ID	Goal	Description
FR8	GL7	A search consists of a set of parameters with associated thresholds. This association can be equal (=), greater (>), greater or equal (=>), smaller (<) and smaller or equal (=<).
FR9	GL5 GL8	When the client introduces a query from the dashboard page ► ref al mockup ◀ and the number of entries that fullfil the query are equal or more than 1000, the system shall show the data in page ► ref al mockup ◀.
FR10	GL5 GL8	When the client introduces a query from the dashboard page ► ref al mockup ◀ and the number of entries that fullfil the query are less than 1000, the system shall warn the client about the impossibility to show the results in page ► ref al mockup ◀.
FR11	GL7	When the system is showing a data batch in the dashboard that fullfils a query (► ref a mockup ◀) and new data that also fullfils the query arrives, the system shall update the view of the data without intervention of the client.
FR12	GL6	When the client introduces a codice fiscale from ► pagina de busqueda de individuos (ref) ◀, the user exists and the client have already obtained the permission of the user, the system shall return the data associated to the individual.
FR13	GL6	When the client introduces a codice fiscale from ► pagina de busqueda de individuos (ref) ◀, the user exists and the client do not have the permission of the user, the system shall prompt the client to ask permission to the user.
FR14	GL6	When the client introduces a codice fiscale from ► pagina de busqueda de individuos (ref) ◀, and the user do not exists, the system shall prompt the client to ask permission to the user <sup>4</sup> .
FR15	GL6	When the client is requesting permission to a concrete user in page ► ref a la page ◀ and clicks on <i>Yes</i> , the system shall emit a ► Ref a la interfaz ◀ to the appropriate user application requesting their permission.
FR16	GL6	When the client is requesting permission to a concrete user in page ► ref a la page ◀ and clicks on <i>Yes</i> , the system shall emit a ► Ref a la interfaz ◀ to the appropriate user application requesting their permission.
FR17	GL6	When a user approves the request of access made by a client, the system shall store that permission.
FR18	GL6	The system shall show the client a list of all users that had give their permission of access in page ► ref a mock ◀ in descending alphabetical order.

Table 3: Functional requirements of the client dashboard

ID	Goal	Description
FR19	GL7	► Pendiente ◀

Table 4: Functional requirements of the client API

ID	Goal	Description
FR20	GL7	► Pendiente ◀

Table 5: Functional requirements of the AutomatedSOS service

### 3.5 Performance Requirements

ID	Description
PR1	► Pendiente ◄

Table 6: Performance requirement

## **4 Formal Analysis Using Alloy**

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

## **5 Effort Spent**

Provide here information about how much effort each group member spent in working at this document.  
We would appreciate details here.

## References

- [1] Kate Moran, “Millennials as Digital Natives: Myths and Realities,” *Nielsen Norman Group*, Jan., 2016. URL: <https://www.nngroup.com/articles/millennials-digital-natives/>.
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- [3] Monika Kapoor, “Digital Behaviour of Gen X, Y and Z,” *Code Brew*, Feb., 2018. URL: <https://www.code-brew.com/2018/02/07/digital-behaviour-of-gen-x-y-and-z/>.
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