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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Requirement Analysis and Specification Document (RASD)

- TrackMe -

v.1.0

Authors

Avila, Diego Emanuel - 903988

Schiatti, Laura Cristina - 904738

Virdi, Sukhpreet Kaur - 904204

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Contents

1 Introduction

1.1 Context

Nowadays, due to the availability of a huge variety of smart electronic devices, more and more applications are developed to help people in their day-to-day activities. In the healthcare field, wearable devices such as smartwatches are highly useful since they can be used to collect information about general well-being of users by means of mobile sensor technologies. As expected, measured data has several possible applications including, patient diagnostics and treatment or research motivations.

TrackMe Technologies is a company that develops health-monitoring devices devoted to measure and record different parameters related to the health status of a person (i.e. body temperature, blood pressure, heart pulse rate and percentage of O2 in the blood) and also their location. TrackMe health smartwatch is synchronized with an app that gives users access to their data and stats.

1.2 Purpose

Taking into account the long list of currently available wearable devices, **TrackMe** is continuously looking for new strategic decisions to combat competition by offering new innovative services. In this opportunity, they decided to generate revenues from user data in a direct way (i.e. extend its business model by implementing **data trading**). This is, selling collected data to third parties -who need to know the health status of the population for different purposes- in an anonymised form.

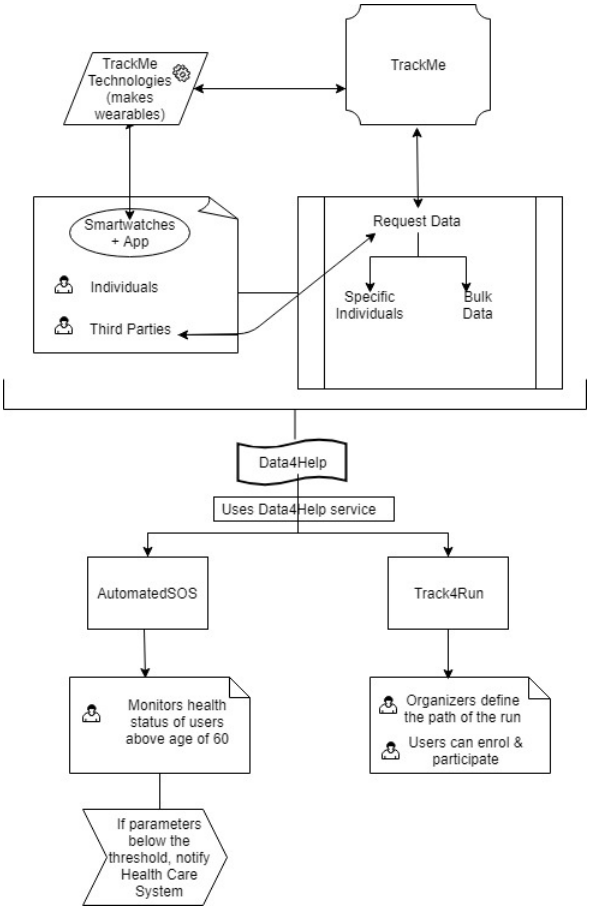
TrackMe new software-based service is called **Data4Help**. This service provides registered third-party companies the possibility to monitor location and body metrics of individuals by exploiting data acquired through their wearable devices.

After some time, TrackMe realizes that a good part of its third-party customers wants to use the data acquired through Data4Help to offer a personalized SOS service to elderly people and decides to build a new service, called **AutomatedSOS**, on top of Data4Help. AutomatedSOS provides a personal alarm service for the elderly subscribed customers by monitoring their health status.

Finally, TrackMe realizes that another great source of revenues could be the development of a service to track athletes participating in a run. In this case, the service, called **Track4Run**, will allow run organizers to define the path, TrackMe wearable-devices users to enroll, and spectators to see on the map the position of all runners during the run.

1.3 Scope

1.3.1 Description of the given problem



TrackMe develops its own health-monitoring smart-watch and bases the assumption that all registered individuals own the same to retrieve the necessary raw data (body temperature, blood pressure, heart pulse rate, percentage of O_2 in the blood, current location) as input for the service **Data4Help**. TrackMe provides the user an interface for the registration of individuals as well as third parties. Individuals who register, agree to TrackMe acquiring their data. They are wirelessly connected to each other. We presume the data to be posted

using a compatible application that comes with the health-monitoring device. As mentioned before, it also supports the registration of third parties. While doing so, we acknowledge the company is legally established by validating its certificate, who can thereafter request for the data of some specific individuals (using SSN) to whom the request will accordingly be sent. The individuals have the choice to subsequently accept or reject it. Alternatively, they can also ask for bulk data based on criteria filtered and provided by the system (such as age, gender, country, province) which will be handled directly by TrackMe. If the request for data acquisition is approved, TrackMe offers these third party customers to subscribe to the new data, in real-time.

AutomatedSOS is built on top of Data4Help to provide an opportunity to users above the age of 60, to subscribe to a new SOS service. AutomatedSOS monitors the health status of these users. When vital parameters such as heart rate, blood pressure, body temperature, percentage of O_2 in the blood are below certain thresholds, the health care system is automatically notified, which accordingly handles the arrival of an ambulance to the location. It must be noted that this post-notification management cannot be tracked.

Track4Run allows 'fit' users to participate in any upcoming run. If the user desires to participate they can accept the request and enrol themselves through a redirected link. We assume that organizers define a valid path viewable to all users before the run. Spectators (read : all users) can view the position of all the participants on the map during the run.

1.3.2 World and Machine Phenomena

- **World Phenomena**
  In order to better understand which entities are relevant for the system and how they interact, it is essential to describe the real world events that are involved, they are
  - TrackMe wearable devices.
  - Individuals sharing their personal data.
  - Third-party customers willing to use the data acquired through the devices.
  - Healthcare system .
- **Shared Phenomena**

- The data collected by the devices (i.e. Blood pressure, Body temperature, Heart rate and Percentage of O_2 in the blood)
- Individuals location and health status
- Healthcare system contact numbers (emergency number)
- The path for the run
- The current location of the athletes participating during the run

1.3.3 Goals

The goals are divided according to each service TrackMe wants to offer to its customers:

- **Data4Help**

  [G1] Provide a service capable to store the location and physical data of an individual, obtained by means of TrackMe's smart devices

  [G2] Provide a service that lets third party companies access an individual's stored data

  [G3] Provide a service that lets a third party companies to access anonymized stored data from groups of individuals, subject to specified constraints

  [G4] Provide third party companies a way to get updates on a specific individual's data or a previously saved search of anonymized data

- **AutomatedSOS**

  [G5] Provide a service capable to notify the health care service when a individual's parameters are below or above a defined threshold

- **Track4Run**

  [G6] Provide a platform that let run organizers to define the running circuit, and participants to enroll to any particular race

  [G7] Provide spectators a way to monitor the participants' location during a race

1.4 Definitions, Acronyms, Abbreviations

1.4.1 Definitions

- **Data trading**: Generate revenew from user data in a much more direct way, by selling user data to a third party.
- **Health status**: Collection of the last measured overall physical health parameters of a user or a group of users.
- **Remote monitoring**: Remote Monitoring (RMON) is a standard specification that facilitates the monitoring of network operational activities through the use of remote devices known as monitors or probes(here, we are using smartwatches).
- **Wearable device**: Devices that can be used to collect data and monitor users' overall physical health, such as body temperature, blood pressure, heart pulse rate, etc.

1.4.2 Acronyms

- RASD: Requirement Analysis and Specification Document

1.4.3 Abbreviations

- $[Gn]$: n-goal.
- $[Dn]$: n-domain assumption.
- $[Rn]$: n-functional requirement.
- $[UCn]$: n-functional requirement.

1.5 Revision History

Version	Last modified date
1.0	11^{th} November, 2018

1.6 Reference Documents

- Requirement Analysis and Specification Document: AA 2017-2018.pdf". Version 1.0 - 26.10.2017

- Henriksen, A., Haugen Mikalsen, M., Woldaregay, A. Z., Muzny, M., Hartvigsen, G., Hopstock, L. A., Grimsgaard, S. (2018)
  Using Fitness Trackers and Smartwatches to Measure Physical Activity in Research: Analysis of Consumer Wrist-Worn Wearables. Journal of medical Internet research, 20(3), e110. doi:10.2196/jmir.9157.
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1.7 Document Structure

This document is divided in six parts, each one devoted to approach each one of the steps required to apply requirements engineering techniques.

- Chapter 1 gives an introduction to the problem and describes the purpose of the application TrackMe. The scope of the application is defined by stating the goals and description of the probl em.

- Chapter 2 presents the overall description of the project. The product perspective includes details on the shared phenomena and the domain models.

- Chapter 3 contains the external interface requirements, including: user interfaces, hardware interfaces, software interfaces and communication interfaces. Furthermore, the functional requirements are defined by using use case and sequence diagram. The non-functional requirements are defined through performance requirements, design constraints and software system attributes.

- Chapter 4 includes the alloy model and the discussion of its purpose. Also, a world generated by it is shown.

- Chapter 5 shows the effort spent by each group member while working on this project.

- Chapter 6 includes the reference documents.

2 Overall Description

2.1 Product Perspective

2.2 Product Functions

The TrackMe environment is composed, as said before, by a set of 3 services, with Data4Help as the leading service. AutomatedSOS and Track4Run are going to be build on top of Data4Help, and will make use of all of its functionalities. Below, the main features of each service are listed, and a description is offered.

- **Data4Help**
  Data4Help will be the leading service, and the features it will provide are mostly related to registered third party companies. Companies will be able to access different types of data from the individuals wearing the TrackMe devices. They will be able to subscribe to a specific individual data, or to a group of anonymized individuals' data, as long as certain restrictions are fulfilled. The individuals, on the other hand, will be able to accept or reject the request of accessing his/her data, and the third party companies will be notified of the individuals' decision.

- **AutomatedSOS**
  AutomatedSOS is a complementary service offered to the senior range of users, and it will be built on top of the Data4Help service. All the elderly individuals of Data4Help will receive a request to subscribe to this service, whose main feature is to contact the individual's National Health Care Service every time any critical health parameter is under or above a defined threshold.

- **Track4Run**
  Track4Run is the last service offered by TrackMe, and it will, also, be build on top of Data4Help. Designed as a service for run organizers and runners, who operate the TrackMe devices. The run organizers will be able to define a running circuit, and send invitations to the TrackMe device users; The individuals will be able to register to any particular competition they prefer. Furthermore, during the duration of each race, all spectators will be able to spot, through the Track4Run site, the location of each registered individual in the circuit.

2.3 User characteristics

2.4 Assumptions, dependencies and constraints

3 Specific requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

3.1.2 Hardware Interfaces

3.1.3 Software Interfaces

3.1.4 Communication Interfaces

3.2 Functional Requirements

3.2.1 Use Case Diagrams

3.2.2 Use Cases Description

3.2.3 Activity Diagrams

3.2.4 Sequence Diagrams

3.2.5 Requirements Traceability Matrix

Goal ID	Req ID	Use case ID	Comments
G.1	RE.3	UC.3	UC.3

3.3 Performance Requirements