

Politecnico di Milano

A.Y. 2017/2018

Software Engineering 2: ***Travlendar+***

**Requirements Analysis and Specification Document**

Matteo Biasielli - Emilio Capo - Mattia Di Fatta

v. 1.0

**Table of Contents**

**1. Introduction**

1.1. Document purpose..………………………………………………...………………….3

1.2. Description of the problem………………………………………………………….3

1.3. Actors………………………………………………………………………………………...3

1.4. Goals…………………………………………………………………………………………..4

1.5. Definitions, Acronyms, Abbreviations………………………………………….4

1.5.1 Definitions……………………………………………………………………….4

1.5.2 Acronyms………………………………………………………………………...4

1.5.3 Abbreviations…………………………………………………………………..4

1.6. Reference Documents…………………………………………………………………4

1.7. Document Structure……………………………………………………………………5

1.8. Revision History…………………………………………………………………………5

**2. Overall Description**

2.1. Product Perspective…...……………………………………………………………….6

2.2. User Characteristics……………………………………………………………………6

2.3. Assumptions, Dependencies and Constraints……………………………….6

2.3.1 Assumptions……………………………………………………………………6

2.3.2 Constraints……………………………………………………………………...7

**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

3.3. Performance Requirements

3.4. Design Constraints

3.4.1. Standard Compliance

3.4.2. Hardware Limitations

3.4.3. Any other constraints

3.5. Software System Attributes

3.5.1. Reliability

3.5.2. Availability

3.5.3. Security

3.5.4. Maintainability

3.5.5. Portability

Formal analysis using Alloy

Effort spent

References

**1. Introduction**

* 1. **Document purpose**

This document focuses on the requirements analysis for the project Travlendar+. The application’s purpose is to support users in handling out one of the most difficult nowadays’ challenges: organization. No previous versions of this application were developed.

This document is meant to be a reference for any person who has an interest in the project. This includes, but is not limited to, development team members, stakeholders and end users.

* 1. **Description of the problem**

The aim of the project is to create an all-in-one system that unites services that are nowadays offered by various different applications(e.g. Calendar, Travel Scheduler). In order to use Travlendar+, final users should be registered and logged in.

Users should be able to schedule their activities directly through the application and, by taking into account travelling times, constraints and preferences expressed by the user, Travlendar+ should:

* Identify the best mobility option;
* Support the user in buying public transport tickets, if necessary;
* Locate the nearest car or bike sharing, if they represent the best solution;
* Warn the user when a place can’t be reached in the available time.

In general, Travlendar+ should make it easier to organize complex schedules, by finding the best compromises between time optimization and the users’ needs and preferences.

* 1. **Actors**
* **Guest**: a person that is not yet registered or logged in. This actor can only see the main page of Travlendar+, where he’s asked to log in or start a registration procedure.
* **User**: a person that is registered and logged in. This type of actor can access to all the features offered by Travlendar+.
* **Third part systems**: external systems that, through the use of APIs, Travlendar+ can use to provide the services it intends to offer.

*(e.g. Google Maps’ APIs can be used to calculate the time needed to move from a place to another by car, bike, public transport system and on foot).*

*(e.g. a car sharing system’s APIs can be used to locate the available cars and propose to the user to use a car sharing service)*

* 1. **Goals**

Travlendar+ features should match with the following goals:

* [G1] Users should be able to use the system properly.
* [G2] Allow users to schedule an activity.
* [G3] Allow users to set constraints and preferences.
* [G4] Simplify procedures and reduce the number of operations that a user has to do to schedule an new activity.
* [G5] Make sure users are on time at their scheduled appointments.
  1. **Definitions, Acronyms, Abbreviations**
     1. **Definitions**
* **User**: actor that is using the application and may want to access all functionalities.
* **Application**: with the term application we are talking about both the desktop version and mobile version of the Travlendar+ system.
* **Scheduling**: action performed by a user that is adding a new activity to his personal calendar.
* **Activity**: whatever the final user wants to schedule, adding it to the calendar and providing the app with its information.
  + 1. **Acronyms**
* **RASD:** Requirements Analysis and Specification Document
* **UI:** User Interface
* **API:** [Application programming interface](https://en.wikipedia.org/wiki/Application_programming_interface)
* **UXD**: User Experience Diagram
* **UML**: Unified Modeling Language
* **GPS**: Global Positioning System
  + 1. **Abbreviations**
* **[Gn]:** the n-th goal
* **[Rn]:** the n-th requirement
* **[NFRn]:** the n-th non-functional requirement
* **[An]:** the n-th assumption
* **[Cn]:** the n-th constraint
  1. **Reference Documents**
* Mandatory project assignments for the A.Y. 2017/2018 available on the beep’s page of the Software Engineering 2 course.
* Projects examples and other documents available on the beep’s page of the Software Engineering 2 course.
  1. **Document Structure**
* **Introduction:** This is the very first part of the document.

In this section it’s possible to retrieve general information about the project and its goals and about the system that is going to be described with more details in the next sections. For the sake of simplicity and to avoid any possible ambiguity, Acronyms, Definitions and Abbreviations that will be used in the whole document have been specified here.

* **Overall Description:** This section will contain a more detailed explanation of the product perspective, that can be useful to visualize and contextualize the project we’re working on. It also highlights the several assumptions and constraints related to the project. Further information about the application’s functions, the user and the requirements will be clarified.
* **Specific Requirements:** This section contains more details and examples about the Graphic User Interface and specifies which are the Communication Interfaces that must be supported by the end-user devices in order to make the application work properly.

In addition, functional requirements will be defined with more details and they will be mapped into goals.

Several UML diagrams will be displayed in this section.

* **Formal Analysis using Alloy:** The source code of an Alloy 4.2 specification of the system.
* **Effort Spent:** Information about the number of hours each group member has spent working on the RASD document.
  1. **Revision History**
* **v. 0.1 [05 Oct 2017]**: added the whole “Introduction” section.
* **v. 0.2 [07 Oct 2017]**: added part of the “Overall Description” section.
* **v. 0.3 [08 Oct 2017]**: completed the “Overall Description” section.
* **v. 1.0 [09 Oct 2017]:** general group revision of the first two sections.

**2.0 Overall Description**

This section includes a summary of the major functions provided by the system, the user characteristics, the constraints and the assumptions over the domain.

**2.1 Product Perspective**

Since the application can be used both on desktop computers and mobile devices and since a user may want to access his calendar from both kind of devices at the same time, data cannot be stored locally. The system we’re going to develop will then consist of an application for the end user and an application for the central server. On the server, users’ data, preferences and schedules will be stored in a Database.

Furthermore, our product needs to be perfectly integrated with some pre-existing systems, such as other car sharing and bike sharing systems, through their exposed APIs.

**2.2 User Characteristics**

As specified in the “Actors” section above, there is no relevant distinction that we have to make between our expected end users, simply because there are no particular kinds of users we are expecting use the application, once it is ready.

Users don’t need any specific knowledge to make a good use of Travlendar+, and, moreover, users’ main life occupations are not really relevant because our application can be used to schedule every kind of appointment, from business meetings to a football match with friends.

* 1. **Assumptions, Dependencies and Constraints**
     1. **Assumptions**
* **[A1] Ubiquity:** Users cannot schedule two different activities at the same time of the same day. This means that the second activity must be scheduled on a different time of the day, or the first one must be deleted.
* **[A2] GPS precision:** to suggest the best mobility option, Travlendar+ has to acquire the position of the user though GPS, if the user hasn’t inserted a starting point manually. We assume that those data have a maximum error of 10 meters.
* **[A3] Email:** Users’ declared emails are supposed to be currently in use. When a user registers, his email is verified. From that moment, then, we assume that the user will not stop using and regularly checking that mailbox.
* **[A6] Accidents:** Accidents and delays are frequent but most of the times online systems that calculate shortest mobility options get to know about them rapidly and take them into account for the solutions they propose. We assume that, if a user is following one of the mobility options given from Travlendar+ (see [A7]), unpredictable accidents that may cause delays have a rate of 10%. This means that the rest of the times (90%) users will be on time at their appointments.
* **[A7] Mobility options:** Users will follow the mobility options proposed by Travlendar+.
* **[A8] Refund policy**: The purchase of a ticket cannot be withdrawn.
* **[A9] Internet**: Users have access to the Internet.
* **[A10] Third part reliability**: The Third part systems we rely on will provide us the service we need at least 99,9% of the time.
  + 1. **Constraints**
* **[C1]** Confidential data inserted by the users must be stored a secure way, according to the actual privacy laws.
* **[C2]** Users’ GPS position can’t be acquired if the user himself didn’t give his consent.
* **[C3]** Failures can happen, but when they happen the system must be able to restart from its status before the failure.

**3.0 Specific Requirements**

**3.1 External Interface Requirements**

**3.1.1 User Interface**

**3.1.2 Hardware Interface**

The Travlendar+ application has been thought and will be developed in order to work on almost any mobile device (supported mobile OS: iOS, Android) and with all best known web browsers (supported web browsers: Safari, Google Chrome, Internet Edge, Safari).

# 3.1.3 Software Interface

The system will have to rely on a third part map and geo localization service in order to provide users with more precise and customized notifications and directions. To furnish Travlendar+ users with a high-quality service Google Maps (<https://developers.google.com/maps/>) and Google Geolocation (<https://developers.google.com/maps/documentation/geolocation/intro> ) APIs will be used.

Additionally, in order to store users’ login credentials and calendar’s data, the application will make use of a commercial DBMS (Database Management System). For this purpose MySQL (Version: 5.7.19, available at <https://www.mysql.com)> has been chosen.

Moreover, to provide some functionalities Travlendar+ has to interface with an external web server.

Furthermore, the system needs to interface with some third part apps and services:

* a weather forecast service in order to provide more advanced and accurate suggestions and instructions. Yahoo! Weather APIs will be used (<https://developer.yahoo.com/weather/)>.
* Third part bike sharing apps and websites such as Ofo and Mobike to be integrated in the application.
* Car sharing service Car2Go APIs to integrate this kind of function in Travlendar+.
* Third part local public transportation apps and website for ticket purchasing.

**3.1.4 Communication Interface**

The entire system will make use of TCP-IP protocol for Internet communication with the web server, the DBMS and users.

**5. Effort Spent**

This section will provide detailed information about the nomver of hours spent on this document.

**Matteo Biasielli**, matr. 893590

|  |  |
| --- | --- |
| **Section(s)** | **Number of hours** |
| 5-oct-17 Introduction | 3 |
| 7-oct-17 Overall Description | 1 |
| 8-oct-17 Overall Description | 1 |
| 9-oct-17 Group work | 3 |
|  |  |
|  |  |
|  |  |

**Mattia Di Fatta,** matr. 893608

|  |  |
| --- | --- |
| 6-oct-17 Introduction | 2 |
| 7-oct-17 Introduction | 2.5 |
| 8-oct-17 Specific requirements | 1 |
| 9-oct-17 Group work | 3 |
|  |  |
|  |  |

**Emilio,** matr. 899842

|  |  |
| --- | --- |
| 6-oct-17 Introduction | 3 |
| 8-oct-17 Overall Description | 1 |
| 9-oct-17 Group work | 3 |
|  |  |
|  |  |

MATTEO

* [R1] Allow the users to manage already existing activities.
* [R2] Users should be able to log in to Travlendar+.
* [R3] Users should be able to register to Travlendar+.
* [R4] Users should be able to set their own preferences that will be taken into account and will be applied to schedules every time this is possible and reasonable.
* [R5] Users should be able to reserve a certain amount of time for lunch every day.
* [R6] When necessary, users should be supported in buying transports tickets directly on Travlendar+ and/or redirected on the correct external page.
* [R7] Users should be warned when they’re scheduling an activity that is not physically possible due to a lack of time or that overlaps with other activities.
* [R8] Solutions involving car and bike sharing systems must be taken into account and proposed to the user when they represent the optimal solution.

EMILIO

* Creation of meetings, with the possibility of a warning if the location is not reachable in the allotted time;
* Computation of travel time between appointments to make sure that the user is not late;
* Identification of the best mobility option among the available ones, including public transportation and sharing systems services. Possible suggestion criterias are potential strikes, weather and user preferences, like walk distance constraints, time ranges regarding the usage of public means and also the possibility to minimize carbon footprint.
* Creation of customized breaks, that allow flexibility in a given time range.
* Purchase of ticket or passes related to the public transportation means.

MATTIA

[G1]: allow the user to add events with details, such as location, time and so on, on a calendar (and on a map) to schedule a day

[G2]: automatically computes time travel (according to user’s current location ??) to help the user to never be late (a push notification system to remember each event will be development at a later time)

[G3]: organize user’s travel, choosing the best means to reach every meeting location to be proposed to the user (several options ranked by time, cost and so on)

[G4]: support the user in his travels allowing him to buy tickets for public transportation, supporting third part bike/car sharing apps and taking in account weather forecast in the choice of travel mean.

[G5]: allow the user to set a wide range of preferences