



POLITECNICO

MILANO 1863

RASD

Requirements Analysis and Specification Document

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Version: 1.0
Date: 31 October 2020
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1 INTRODUCTION

1.1 Purpose

The purpose of the project CLup (Customer Line-up) is to develop a digital system of line up that saves people from having to stand outside of stores for hours, avoids crowds inside the store and, more in general, allows to regulate the influx of people in the stores.

The idea is to create a digital version of the traditional mechanism of lining up that is easy to use by everyone. In this way, the system would help to deal with the strict rules imposed by government due to the global pandemic.

The system should give customers the possibility to line up from their home and approach to store only when their number is close to being called. This mechanism should avoid the situation in which the customers wait their shift in proximity of the store that is not an acceptable scenario in a lockdown situation.

G.1	Allows to regulate the influx of people that enter in the building.
G.2	Avoids that customers must line up and wait outside of stores for hours.
G.4 Violet	Allows customers to line up or book for a visit at the store from home.
G.3	Crowding are avoided in all forms inside the shop.
G.4	Line up are accessible by everyone, also for people who do not have access to the required technology.

1.2 Scope

The software should represent a digital alternative to the situation in which people retrieve a physical number that gives their position in the queue when they want to enter in a store.

C-Lup should provide three main features:

- **Lining up:** allows customers to line up from their home avoiding crowds outside the stores. It should include tools to regulate the influx of people into the store and a notification system that alerts people when their number is close to being called. These alerts should consider the time customers need to get to the shop from the place they currently are and should be based on a precisely estimation of the waiting time. Moreover, C-Lup must provide effective fallback options for people who do not have access to the required technology. Lastly, the system should consent to indicate the categories of items that the customers guess to buy. This would allow to manage better the space into the store and optimize in a more efficient way the number of people not only in the whole store, but also in each sector of the supermarket.
- **Booking:** allows customers to book a visit to the supermarket. Since the time that it takes to visit a supermarket is not uniform, the system should give to user the possibility to specify an estimation of the duration of the visit. Alternatively, it might infer this information analysing the previous visits, if any. Also in this case, the customers should can specify the sectors of the supermarket that they think to visit.
- **Suggestions:** suggests different time slots for visiting the store (also in different days) to deal better with the restriction in the number of people inside the store. Alternatively,

the system should propose to the customers other available supermarkets and alerts them in the case a new time slot becomes available (e.g. after the deleting of a booking by another customer).

The customer that wants to use the service must be registered. Thanks to this, the system would be able to track the lining up, the booking and the duration of the previous visits and use this information to manage better the influx of people and estimates with an acceptable accuracy the waiting time.

World Phenomena

W.1	Limitation on the number of entrances into buildings.
W.2	Distance of at least one meter between people.
W.3	Prohibition of gathering and long lines near the groceries.
W.4	Required technology is not accessible to everyone.
W.5	Variable visit time inside the shops.

Shared Phenomena

S.1	Regulation of the influx of people in the shop.
S.2	Management of the lines outside of stores.
S.3	<i>Line up</i> at the store from smartphone.
S.4	Monitoring of the entrances by store managers.
S.5	Estimation of the waiting time.
S.6	Notification that alerts customers when their shift will begin shortly.
S.7	<i>Line up</i> for people that does not have access to the required technology.
S.8	Booking a visit to the supermarket.
S.9	Estimation of visit time inside the shops.
S.10	Suggestion of different stores of different chains.
S.11	Suggestion of different time slots to visit the store.
S.12	Periodic notification of available time slots in a day/time range.

1.3 Definitions, Acronyms, Abbreviations

1.3.1 Definitions

Thematic sectors	Areas of the store that sell a specific macro-category of products. They are food, electronic, clothing and care products.
Time slot	Period of time or day that can be chosen for a booking by the customers.
Store data	Data about the store like number of people allowed in each thematic sector, opening and closing times, address, name and photo.

1.3.2 Acronyms

CLup	Customer Line-up

1.3.3 Abbreviations

Wn	World phenomena n-th.
Sn	Shared phenomena n-th.
Gn	Goal n-th.
Rn	Requirement n-th.

1.4 Revision history

DATE	DESCRIPTION
31/10/2020	First version and goals definition.
07/11/2020	World and shared phenomena definition.

1.5 Reference Documents

- *Requirement Engineering and Design Project: goal, schedule, and rules*
- *I&T assignment goal, schedule, and rules*
- Slides of the course *Software Engineering 2*

1.6 Document Structure

The document is composed by six chapters. They are the following:

- **Chapter 1:** provides an introduction about the purposes and the whole scenario of the software. First, it includes the general description of the system and the goals. Then, there is a sufficiently detailed specification of the main features that the system should provide and the analysis of the world and shared phenomena. Lastly, it includes the list of abbreviations, acronyms and definitions used in the document, the revision history, and the reference documents.
- **Chapter 2:**
- **Chapter 3:**
- **Chapter 4:**
- **Chapter 5:** shows the amount of time that each member has spent to produce the document.
- **Chapter 6:** specifies the reference documents and online resources used during the production of this document.

R.1	The system generates QR codes to enter to the store.
R.2	The system allows customers to book a visit to the supermarket.
R.3	The system provides customers a precise estimation of the waiting time.
R.4	The system uses the customers' current position to estimate the waiting time.
R.5	The system alerts the customers before their shift according to the geolocation information.
R.6	The system allows people (who do not have access to the requirement technology) digitally line up directly when they are at the store.
R.7	The system suggests alternative time slots for visiting the store when the desired one is not available.
R.8	The system suggests alternative stores when the desired one is not available.
R.9	The system allows customers to insert the approximate expected duration of the visit.
R.10	The system infers customers' expected duration of the visit based on an analysis of the previous visits.
R.11	The system also allows users to indicate the categories of items that they intend to buy.
R.12	The system provides periodic notifications of available time slots in a day/time range.
R.13	The system shows the list of the shops.
R.14	The system shows the available time slots for each grocery.
R.15	The system shows the customer's position in the line.
R.16	The system requires a sign in/login.

R.17	The system shows the active bookings.
R.18	The system shows the history of the bookings.
R.19	The system allows customers to delete a booking.
R.20	The system generates QR codes to exit from the store.
R.21	The system uses the information about the customer that exit to the store to infer better the waiting time.
R.22	The system allows the store manager to scan the QR codes.
R.23	The system provides to store manager with a QR code printing service.

D.1	The customers wait until their number is close to being called to approach the store.
D.2	The time that it takes to visit the supermarket is not uniform.
D.3	The approximated expected duration of the visit indicated by the customer is reliable.
D.4	The supermarket is divided in four different thematic sectors (food, electronic, clothing and care products).
D.5	Customers can get into the store if and only if they scan a valid QR code.
D.6	All customers that want to access to the store use the digital system of line up.
D.7	Each customer visits only the thematic sector specified during the booking or lining up.
D.8	Customers exit from the store only after they had scanned a valid QR code.
D.9	Store data are provided by the store owner and are already present into the DB.
D.10	The store manager with the digital system helps people who do not have access to the requirement technology to line up directly when they are at the store.
D.11	The store manager prints the QR code for people who do not have access to the requirement technology.

2 OVERALL DESCRIPTION

1.7 Product perspective

1.8 Product functions

1.9 User characteristics

1.10 Assumptions, dependencies and constraints

3 SPECIFIC REQUIREMENTS

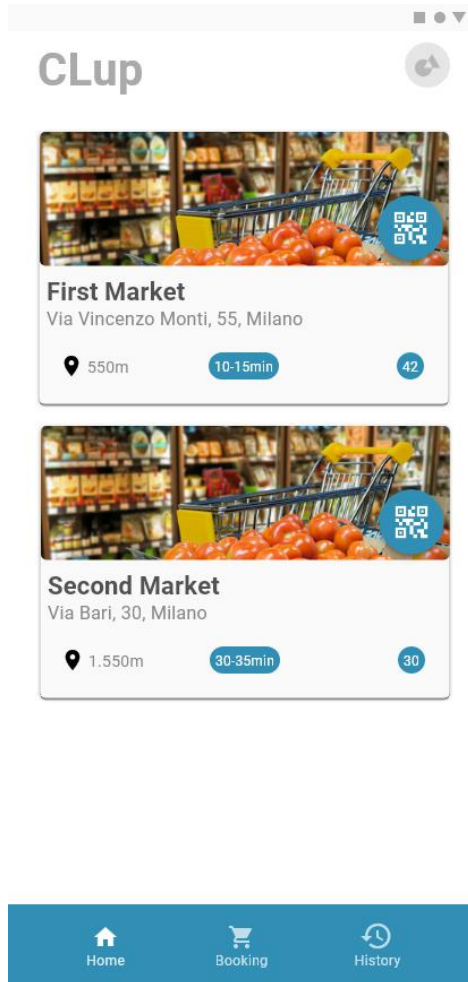


Figure 1 - home page mock-up

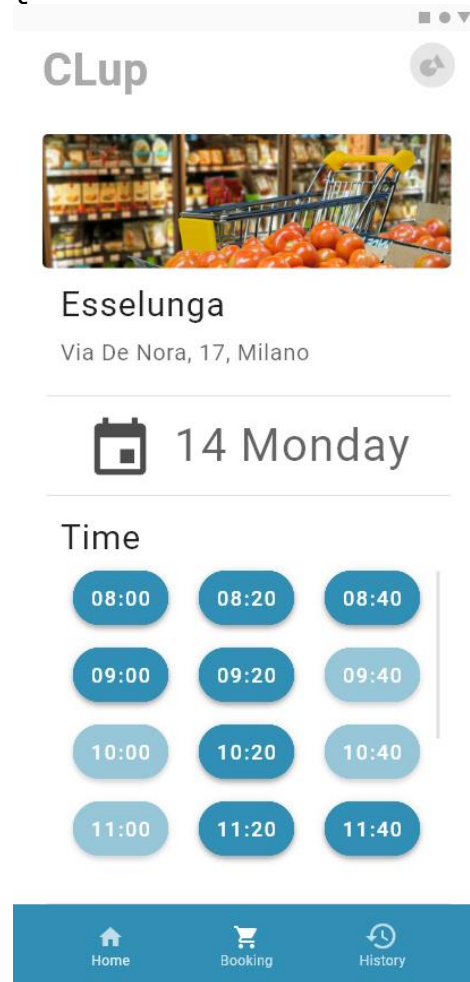


Figure 2 – booking page mock-up

- 1.11 External Interface Requirements
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 - 1.24 Security
 - 1.25 Maintainability
 - 1.26 Portability
- 1.27 FORMAL ANALYSIS USING ALLOY
- 1.28 EFFORT SPENT

This section shows the amount of time that each member has spent to produce the document. Please to notice that each section, diagram, and specification is the result of a coordinate work. The column *Member* specifies only the main contributor (or contributors, if more than one) for each topic but should not be interpreted as a lack of participation by other team members.

TOPIC	MEMBER	HOURS
General brainstorming and interpretation of the domain	Digregorio, Massaro, Tamma	3.5h
Creation of the document and identification of the goals	Digregorio, Massaro, Tamma	3h
World and shared phenomena	Digregorio, Massaro, Tamma	2.5h
Requirements	Digregorio, Massaro, Tamma	3h
Mock-up and sequence diagrams	Digregorio, Tamma	3h

1.29 REFERENCES