

# Experience Report - R2

## Requirements specification for Student Accommodation Matcher System

Group 10

**Abstract** Requirements engineering is an important part of software engineering that enable to define, document and maintain requirements of a software. Elicitation is a technique in requirements engineering used to research and collect requirements from customers, users and stakeholders. In this project, interview and brainstorming elicitation techniques are used to collect the requirements of the system. The requirements collected through elicitation are presented using context diagram, task description, stakeholder map, data model and data dictionary, which are types of specification styles. Prioritisation techniques were later used to define the functional and non-functional requirements of the system. A Mockup was created to show the realistic representation of what the system will look like. The team has learned that the specification styles are used at different levels of specification and mockup is also an important technique to show the design choices and to identify problems of the system at an early stage.

**Keywords** *Elicitation, requirements prioritization, mockup, brainstorming, data model, data dictionary and interview*

### I. INTRODUCTION

The high demand for accommodation is a worldwide issue at this time, and Gothenburg is not an exception. Gothenburg is the second biggest city in Sweden where students come to study every year. However, due to the high demand for accommodation students are facing difficulties to find accommodation for the period of their study. Existing agencies often use queue systems that are long and frustrating, which may lead to students not getting accommodation in time or not getting it at all. Students have to look for accommodation in several places where other people already have been registered and collected queue points for a long time. Because of this students want a system where they can find accommodation as soon as they have been

admitted to the university without the need to be in a queue for a long time before coming here.

### II. TECHNIQUES

The team used the following methods to document the requirements for the project idea selected.

#### A. Elicitation

Eliciting information from related stakeholders regarding their needs and expectations is one of the key initial tasks that need to be done. Two of the elicitation methods used are explained below.

##### a) Interviews

Lauesen [1] lists interviews as one of the methods to involve the stakeholders and suppliers in the requirements gathering process. Lauesen suggests interviewing both expert and ordinary users alike [1]. Students and landlords were selected as the primary stakeholders to interview. The team created a list of questions that it wanted to be answered. The team tried to make the questions as open-ended as possible. 21 people (16 students and 5 landlords) were interviewed in the process. The interviews provided different perspectives regarding the needs of the stakeholders. Even the same type of stakeholders have different needs and expectations depending on their situation. For instance, the needs of an international student differed from those of a domestic student even though they are of the same stakeholder type. Most of the responses were as anticipated by the team. Since the team members had some prior knowledge of the problem domain, there was some bias regarding anticipation of the responses. Follow-up interviews are planned with the stakeholders with detailed questions to refine the requirements documentation prepared by the team.

### *b) Brainstorming*

Since the team members have prior knowledge in addition to the knowledge they gathered through interviews, brainstorming is an appropriate technique to come up with new ideas. In this technique, the team worked in two phases; first a moderator gathered ideas from each team member, and then each idea was discussed and analysed.

The team then combined various responses from the interviews and brainstormed the possible requirements for the system. The team devised additional requirements besides the requirements obtained through interview. The members are motivated to stimulate new ideas with respect to the problems that they gathered from their interview sessions. Any new ideas raised by the team members were noted without any criticism. This motivated every team member to come up with his/her own new ideas without being shy or afraid.

The new ideas and requirements raised through brainstorming were discussed and analysed by the team members to filter the ideas and requirements that are appropriate to the project at hand. After thorough discussion and analysis the team members selected the most important ideas and requirements that pertain to the proposed idea.

## *B. Specification*

### *a) Context Diagram*

There are many ways to represent the working of a system but the team chose to use a context diagram. The context diagram gives a high level abstraction of how the system works. This was found by the team to be a great way to represent the system from the customer point of view, who is not aware or concerned with high level of technical detail but at the same time covers all the important components involved in the working of the system..

### *b) Task description*

The description of the tasks which needs to be implemented by the system are divided into work areas to complete the task description process. The work areas are further divided into subtasks to show the working and the whole process of specific work area. The work area includes the number of users using or performing a subtask along with the information of start and end of the task process. It also shows the frequency of a user performing a specific task and the frequency of task being used. The tasks that the system will perform are divided among five general work areas along with subtasks to show the working of the system. The task description technique was used to ensure the full working of the system in the simpler manner. It provides the overall working and concept of the system. It was not easy to

use this technique but after implementation of the technique, we achieved our expected goal.

### *c) Stakeholder map*

The team has also used stakeholder map as one of the specification techniques. With the use of a stakeholder map, the team was able to identify all of the stakeholders that have an impact on and/or influence the system. The stakeholder map is divided such that those on the right of the map have impact and those on the left have less impact. Similarly, the stakeholders on the top have high influence and those at the bottom have less influence. After a few iterations of the stakeholder map, the team has derived the latest version, which best resembles the impact and the influence of each stakeholder. The team also prioritized the requirements according to the impact and the influence of the stakeholders.

### *d) Data model & data dictionary*

Data are described at different levels of abstraction. In order to describe what data to include in the system, the team chose to use both explanations, data models and data dictionaries for specification. For the core functional requirements, an example of a more detailed level is provided by the data tables and the class diagram. The data tables describes what type of data is required and gives additional information and examples of values in order to minimize uncertainty regarding the purpose of the data. The class diagram illustrates cardinality relationships and how one type of data is related to another one.

The team used data dictionary to specify the intended source and use of data. The source describes in what context the data is created. The use of data both describes the purpose of the data and how it is related to the tasks to support. The team found data dictionary as a suitable technique since it provides a good overview of why certain data is necessary for the system without going into too technical level of detail, as for the data models. Explanations and descriptions of data are included to minimize the risk of misunderstandings.

## *C. Prioritization*

To prioritize both, functional and non-functional requirements, the team members discussed about which requirements have higher priority, and which requirements require less focus. Team ended up using two methods for that, MoSCoW and Scorecard.

### *a) MoSCoW*

MoSCoW, a numerical assignment technique [2] is used because it is easy to apply when managing requirements. It gives the team members a clear overview of what the team as customer really want to have included in each software release. The team

grouped the requirements according to highest priority that the system must have in order to satisfy its core value. To achieve that, the team created a list of requirements which has to be delivered. For each requirement listed, the team decided about its importance by using MoSCOW methodology. Categories used to do prioritization are: Must, Should, Could, Won't. Requirements marked as "Must" have the highest importance for the system's functionality. "Should" category includes requirements which should be included, but in case there is not enough financial support for the development, the core of the system still can be fully functional without implemented these requirements.. Requirements listed as "Could", would be nice features for the system itself, but not including them does not negatively affect the system itself. "Won't" category in this stage of development we did not use

On every requirement listed, each team member put their own estimation of importance. Finally, requirement importance on each requirement is set based on what level of importance dominates in the selection process.

In Release 2 the team reorganized functional and non-functional requirements across the document and based on that, requirements were reprioritized. Introducing new sections, prioritization from Release 1 was changed. The team realized that having focus on security as non-functional requirement is high importance for the system, therefore this requirement was grouped in the requirement list as standalone, in comparison with other non-functional requirement which are grouped as "G2 - G4. Non-functional requirements".

#### *b) Priority Scorecard*

To support the prioritization method mentioned above, Scorecard technique is used [3]. Instead of choosing requirements randomly based on team members' opinions, this technique helped us to include various factors important for the system. The team introduced five factors important for the SAM system. Key factors for the system are:

- User experience: One of the key factors since the system is focusing on providing a service to the user.
- Revenue: Functional requirements which will provide revenue for the owners. The requirements which provides more revenue have highest priority.
- Operation efficiency: Ensures minimum operational cost and effective adaptation to continuously changing market by streamlining the core processes.
- Security: Main focus is on data security.
- Maintenance: Core features of the system shall be constantly maintained to ensure high quality service and product.

By introducing various factors applied on the system, the team gets a deeper understanding of what

requirements will need more financial support and what areas are affected by each requirement. The results of prioritization using this methodology indicates if requirements prioritized using MoSCOW actually meet the stakeholders' needs. When using this methodology, the stakeholders decided what are the most important criteria that impact the cost-value relationship. The goal was to have the most beneficial requirements on top, followed by security as the next most important goal.

### III. LEARNING OUTCOME

In this section, lessons learned from the project are presented.

The team experienced how difficult it is to write requirements specification. Lauesen describes that a good requirements specification, for example, is complete, unambiguous and verifiable [1]. These three examples are the ones that the team has discussed the most. The team found that it is difficult to know whether the level of detail is good enough to include all necessary requirements. It was hard to balance the level of detail. In other words, it is not easy to know when the specification is complete.

The team experienced how useful different specification techniques are. A context diagram gives a good overview of the system. It is helpful in the way that it describes the system on a high level. For the more detailed levels, task description serves as a good technique for specifying what to include. The team regarded a task as something that should be done without interruptions and that the end of it was regarded as an achievement. This made it easier to keep the tasks on a similar level of detail. Many of the requirements that the team had in mind were difficult to verify. This was handled by creating event and function lists, which were easier to use as checklists for verification.

During the prioritization of requirements, the team faced issues when deciding on what technique to use. With the fact that there are various techniques applicable, the team spent some time to understand which one will suit the goals best. The team learned that using only one technique is not enough to prove if the prioritization done is really what the team wants. Including one more prioritization technique on the same requirements gave different point of view what requirements are actually important and it reflected prioritization more accurate. Moreover, since the team does not have direct contact with all stakeholders at the moment, it was an important insight that the team had to imagine how different stakeholders' perspectives could influence the prioritization.

The team realized the importance of good specification documentation when going through the identified requirements. When working with the requirements specification, the team realized that the requirements were ambiguous initially. This provided the insight that is important to work together with the specification.

One challenge faced during specification of data was the level of detail required to specify what is asked for without limiting the supplier's ability to come up with own suggestions and solutions. The team approached the challenge by providing the supplier with example solutions in the data dictionary, examples that guide the supplier in the desired direction.

One of the key learnings was that it is very difficult to have a clear picture of all necessary requirements at the earlier stages of product specification. As the team worked on the requirements document, many additional requirements and features were added and reprioritization was done. It is clear that the team got a better understanding what the team wants the final product to be.

#### *D. Mockup*

In the Release 2, based on the feedback given from the supervisor, the team come up with a mock-up. Mockup is the realistic representation of the system that will be developed. It can be used to show the design choices for the system. It is helpful to create an intuition on what the final product looks like to the stakeholders in the early stage instead of waiting until the development is over. Moreover, mockups are important to identify problems that are not visible in the requirements documentation paper such as how the system would look like in the real-time environment (eg: entities of forms the user needs to fill up). It also makes revision on the design of the system easier, compared to making revision at the final stage of development. Hence, the team has created a mockup that shows what the core functional requirements of the SAM system design will look like.

#### *E. Creativity Session*

In creativity session, We were given different techniques to work on and use them in our project. We basically used two techniques to work on which were creativity triggers and hall of fame.

##### *a) Hall of Fame*

Hall of Fame [4] is a technique that produces ideas and insights by formulating ideas by thinking of someone's (fictional or real) traits and behaviors. The process involves creating a 'Hall of Fame,' which is

a physical representation (either on a board or paper) of those traits and behaviors. The team selected four personas - Steve Jobs, Pele, and Sherlock Holmes. Any idea that came to discussion was noted on the board.

After choosing the personas, the team decided to find our requirements by thinking the ideas according to these personalities would have thought. The team used a questionnaire to think of ideas for gathering requirements. The team deliberated on how each of the characters would have thought of the requirements for the project. After the team gathered the requirements, they were noted and prioritized to be included in the project.

##### *b) Creativity Triggers*

Creativity triggers [5] provide guidance to stakeholders to discover new requirements associated with a particular quality of a product, service or system – a quality that is believed to be associated with innovative solutions. One example of a creativity trigger is convenience, which guides the stakeholders to construct a hassle-free product, service or a system. While using this technique, the team used six triggers to work on and find new requirements according to them. They include adaptability, completeness, economy, lightweightness, entertaining and durability. The Creativity Triggers produced more ideas compared to the Hall of Fame technique. So the team decided to use it for further requirements generation. The team found it challenging to relate the characters of the Hall of Fame with the project scope. This further elevated the selection of Creative Triggers as the choice between the two techniques. By using the techniques, the team learnt to gauge their effectiveness and use it to improve and add to the projects requirements..

#### *F. Group dynamics*

Working on this project, the team did not face some bigger issues. At the very beginning, the team was talking about each member expectations and what each member prefer when it comes to teamwork. The team had structured meetings as well as clear and open communication. The team ensured that each member understand the scope and goal with this project and that everybody has a clear picture of what to do and how to do it. Introducing internal deadlines ensured on time delivery for each Release. Meetings

were setup on weekly basis with respect to the available time for each team member. Members who could not be physically present, the team ensured participation by using online conferencing. The workload was divided so that each member can actively contribute in writing both specification and experience report. Some team members put more effort into the work than others but all members contributed to the final product.

#### IV. CONCLUSION

Requirement engineering is a difficult but an important part of software engineering. It is useful to know the customer's needs, and verify and validate the requirements gathered by the supplier to develop a software. In this requirements specification project, the team has learned different techniques and methods used in requirements specification. Requirements specification styles such as context diagram and task description are a good way to present the high-level overview and the detailed description of the system respectively. Interview and brainstorming techniques are used to elicit the requirements of the system. Interview is a good way of gathering requirements and gain a thorough understanding of the domain knowledge. Moreover, brainstorming is also a useful elicitation technique when the analyzers have domain knowledge about the proposed system. In conclusion, the team understood that the choice of the different techniques of requirements specification depends on the nature of the project.

#### V. BIBLIOGRAPHY

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