Market Driven Requirements Engineering Strategy for Startups

Bachelor of Science Thesis in Software Engineering and Management

OLLE RENARD
OSCAR BERGSTRÖM

Department of Computer Science and Engineering
UNIVERSITY OF GOTHENBURG
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2018
A study of Requirements Engineering Practices in Startups
The study includes a literature review of startups and requirements engineering which in combination with interviews from a startup results in challenges and practices in that specific startup.

O. RENARD
O. BERGSTRÖM

© O. RENARD, June 2018
© O. BERGSTRÖM, June 2018

Supervisor: E. KNAUSS
Examiner: J. HORKOFF

University of Gothenburg
Chalmers University of Technology
Department of Computer Science and Engineering
SE-412 96 Göteborg
Sweden
Telephone + 46 (0)31-772 1000

Department of Computer Science and Engineering
UNIVERSITY OF GOTHENBURG
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2018
## Contents

<table>
<thead>
<tr>
<th></th>
<th>1 Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.A</td>
<td>Research Questions</td>
</tr>
<tr>
<td>1.B</td>
<td>Assumptions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2 Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.A</td>
<td>Definition of Startup</td>
</tr>
<tr>
<td>2.B</td>
<td>Trovisio</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>3 Related Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.A</td>
<td>Relevant literature from the problem domain</td>
</tr>
<tr>
<td>3.B</td>
<td>Literature on potential solution approaches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>4 Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.A</td>
<td>Strategy for the investigation of the problem</td>
</tr>
<tr>
<td>4.B</td>
<td>Interviews</td>
</tr>
<tr>
<td>4.C</td>
<td>Interviewees</td>
</tr>
<tr>
<td>4.D</td>
<td>Coding</td>
</tr>
<tr>
<td>4.E</td>
<td>Evaluation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>5 Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.A</td>
<td>RESS: Requirements Engineering Strategy for Startups</td>
</tr>
<tr>
<td>5.A.1</td>
<td>Elicit Market Needs</td>
</tr>
<tr>
<td>5.A.2</td>
<td>Create Requirements</td>
</tr>
<tr>
<td>5.A.3</td>
<td>Prioritize Requirements</td>
</tr>
<tr>
<td>5.A.4</td>
<td>Implement Requirements</td>
</tr>
<tr>
<td>5.A.5</td>
<td>Verification and Validation</td>
</tr>
<tr>
<td>5.B</td>
<td>Evaluation of RESS model</td>
</tr>
<tr>
<td>5.B.1</td>
<td>Elicit Market Needs</td>
</tr>
<tr>
<td>5.B.2</td>
<td>Create Requirements</td>
</tr>
<tr>
<td>5.B.3</td>
<td>Prioritize Requirements</td>
</tr>
<tr>
<td>5.B.4</td>
<td>Implement Requirements</td>
</tr>
<tr>
<td>5.B.5</td>
<td>Verification</td>
</tr>
<tr>
<td>5.B.6</td>
<td>Validation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>6 Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.A</td>
<td>Threats to Validity</td>
</tr>
<tr>
<td>6.B</td>
<td>Implications for Research</td>
</tr>
<tr>
<td>6.C</td>
<td>Implications for Practice</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>7 Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.A</td>
<td>Summary</td>
</tr>
<tr>
<td>7.B</td>
<td>Outlook</td>
</tr>
</tbody>
</table>

References | 8
Abstract—This report investigates the concept of requirements engineering in startups. There are well known best-practices in requirements engineering in software engineering domain for large businesses, but there is a lack of best-practices within the startup domain. What constitutes an RE strategy for startups? By researching and reviewing literature we develop a strategy which we use as a base for finding challenges and practices through interviews at a startup called Trovisio. The result is a Requirements Engineering Strategy for Startups, and identified practices and challenges at Trovisio. The conclusion describes communication as one of the key focus points as well as including the market needs throughout the development process.

Keywords—strategy; requirements engineering; startups; market; RESS-model;

1. INTRODUCTION

Startups operate within a domain of extreme uncertainty [1]. Davis et al. shows the importance and problematic nature of RE (requirements engineering) [2]. Ahrend’s paper concludes that there is a lack of empirical research of how process of requirements are handled in startups [3]. Bajwa et al. concludes their paper by stating “Our research also reinforces the idea that each start-up is unique and that creating tools and practices applicable to all is difficult. Each combination of triggering factor, pivot type, and company context requires a customized approach.” [4] According to Grahla et al. [5] startups typically use a mixed practice made up of Agile [6], lean development [7], continuous integration [8] and DevOps [9]. The research made on the topics toward a lack of empirical evidence [10].

The solution this thesis aims to provide is a market driven RE strategy for startups as base for future research on the subject. We investigate a startup company developing a software used by head hunters to find candidates for available vacancies. The focus of the thesis is on the industrial setting of startups. An RE strategy which focuses on eliciting the markets’ needs could improve the startups chance of success [10]. With the help of literature reviews on the topic of RE strategies (both within and outside of the domain of startups) we compare a proposed RE strategy to Trovisio’s current practice. We can possibly find aspects that can be generalized towards a singular best practice or at least provide a basis for future research. Our results will contribute to the existing gap in the literature of requirement engineering in startups.

A. Research Questions

- RQ1: What constitutes a Requirements Engineering strategy for startups?
- RQ2: Can the proposed RE strategy help improve Trovisio’s requirements engineering practice?

B. Assumptions

The thesis is based on the assumption that startups’ RE practices are directly related to the potential success in a startups ability to meet the needs of the targeted market. The assumption will influence the strategy to be focused on the market needs elicitation.

2. BACKGROUND

A. Definition of Startup

Ries defines a startup as "A startup is a human institution designed to create a new product or service under conditions of extreme uncertainty" [1]. Sutton defines characteristics widely representative of startups [11]. These include the characteristics:

- Youth and Immaturity - a startup company is new or relatively young and inexperienced compared to more established and mature development organizations. They have little experience.
- Limited Resources - the startup companies have low budgets and therefore focus on getting the product out, promoting the product, and building strategic alliances.
- Multiple Influences - in early stages a company might be sensitive to influences from sources of various forms like investors, customers, partners and competitors. These various influences can also diverge from each other and be inconsistent.
- Dynamic Technologies and Markets - startups often develop innovative products with new technology and/or within new markets.

B. Trovisio

Trovisio is a young startup of 1 year which is using an Agile framework as well as lean development. These practices are considered best practice in software engineering startups and is included in the RE strategy which we propose in the thesis [1]. The product currently developed by Trovisio is an application for consultants and companies in need of consultants. The goal for Trovisio is to cut out the middleman in the consultant business and get consultants in direct contact with the companies which are offering a contract and vice versa. Because the application deals with both sides of the market the consultants are referred to as clients while the companies are referred to as customers.

3. RELATED WORK

A. Relevant literature from the problem domain

The startup industry domain is largely unexplored [12]. There is a big difference between large scale companies and their RE practices and startup companies processes. Research suggests that the best practice within large companies is not comparable to startups, since they operate under entirely different circumstances [1]. Therefore the selection of literature for the thesis is slim, mostly focused on research within the startup domain.

Grahla et al. [5] study the evolution of requirements practices in software startups. The study revolves around the concept of six dimensions which, if improved, could increase a startups ability to reliably deliver high quality products, manage requirements more efficiently and add staff to help reach these goals. The dimensions mentioned are requirements artifacts, product quality, knowledge management, technical debt and requirements-related roles.
Jan-Marten Ahrend’s paper [3] presents a research project of how requirements elicitation in startup companies are carried out. The paper concludes that there is a lack of empirical research of how requirements are handled in startups and that filling this research gap would likely have implications on the practice.

B. Literature on potential solution approaches

Grahla et al. [5] have addressed an unstructured practice to be the main issue. As the startup evolves the RE practice does not evolve and mature with it. The proposed solution is as stated in the section above, to improve one or more dimensions in their six dimensional theory. The theory states that the dimensions are linked and an improvements in one dimension could improve other dimensions directly. The study is using Grounded Theory as a tool to evaluate the RE practices of the 16 companies in the study.

Melegati et al. [13] did an interview study with 9 different Brazilian startup companies and proposed an RE practice. This study also uses the Grounded Theory for analyzing data with techniques such open and axial coding. Assumptions made in the study is that RE in startups is a large factor of over all success.

Bajwa et al.’s study [4] describes how “almost all the reasons for pivoting were related” and that startups should focus more on the customers from the start instead of developing a solution and then look for a customer segment.

The study ”Key Challenges in Early-stage Software Startups” presents a set of challenges for startups in the early stages of the life cycle. The study finds that technological uncertainty and acquiring the first paying customers are the most common issues in the early stages. It is also claimed that despite the vast majority of startups are failing it has not yet obtained a scientific body of knowledge. The focus is mainly on challenges and not solutions which could provide enlightenment of current problems we might face but does not provide any concrete solutions for them [14].

Nuseibeh and Easterbrook define RE as the process of discovering that purpose by identifying the stakeholders and their needs, documenting the discoveries for future analysis, communication and implementation [15]. In the earliest stages of a startups product development phase the startup must use the knowledge of the market and the product to create the first requirements and the artifact. Therefore it is important to enter the startup industry with an overview of the markets segment of interests’ current needs. The idea of the product should based on a problem in the targeted domain which can be verified by stakeholders even before the development starts through pitch meetings and feedback.

Goal-oriented RE is a type of RE which puts the focus on what the system should be able to do in the end. On the contrary to market-driven, it does not iteratively change the requirements based on feedback. Instead the goals are gathered early in the project and then followed as a guideline to be the benchmark for the systems functionality [16]. Therefore it does not serve the purpose of a strategy for startups. The strategy should not focus on the end-goal but instead allow the system to evolve as needed according to the current and potentially shifting market needs.

4. Methodology

A. Strategy for the investigation of the problem

The method for developing a solution is a case study [17]. We investigate the real-life phenomenon of RE within startups in order to understand limitations and advantages of methods, producing a result consisting of a description of current practice. As part of understanding the RE practice at Trovisio we compose a model from known best-practice methods. We conduct a literature review in order to form an RE strategy suited for startups, which will be the answer of RQ1. The interviews and observations at Trovisio gave us an understanding of their current RE strategy and how our proposed solutions could improve it. The interviews and observations answers RQ2 and consists of open ended questions for qualitative data. We derive the interview questions from the results of RQ1. Since we have no resources and a limited time frame we have decided to work with convenience sampling.

B. Interviews

The interview process started together with our proposed RE strategy. We derive questions in order to answer RQ2. The questions points towards finding differences or similarities between our model and the one used at Trovisio. We ask, for example: "Which RE methods are you using at Trovisio?" as well as "What are the differences according to you between our proposed RE strategy compared to Trovisios’ current practice?". The complete interview guide can be found in the appendix. The target population of the interviews is all 8 of the Trovisio employees but unfortunately due to time constraints we only managed to interview 7 of them. The employee who was not able to be interviewed is one of two sales representative.

C. Interviewees

To anonymize the interviewees we will refer to them as N1, N2... N7. The interviewees assigned number will remain the same throughout the paper for consistency to the reader. The following table presents the role and experience of the interviewees 1-7.

<table>
<thead>
<tr>
<th>Interviewees</th>
<th>Person</th>
<th>Role</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Front-End</td>
<td>1 year</td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Back-End</td>
<td>12 years</td>
<td></td>
</tr>
<tr>
<td>N3</td>
<td>Product Owner</td>
<td>33 years</td>
<td></td>
</tr>
<tr>
<td>N4</td>
<td>Back-End</td>
<td>2 years</td>
<td></td>
</tr>
<tr>
<td>N5</td>
<td>QA</td>
<td>2 years 5 months</td>
<td></td>
</tr>
<tr>
<td>N6</td>
<td>Marketing</td>
<td>12 years</td>
<td></td>
</tr>
<tr>
<td>N7</td>
<td>Front-End</td>
<td>1 year 6 months</td>
<td></td>
</tr>
</tbody>
</table>
D. Coding

After transcribing the interviews we thoroughly study the data and start the process of coding. [18] We refer to coding in this context as categorizing the text chunks from the interviews and sorting them into different “buckets” corresponding to the different aspects of the interviews. After categorizing the text chunks we sorted them again into the different sections of our RESS model, identifying them as either challenges or practices. Lastly, the data was categorized by the individual who contributed with it to be able to refer the interviewee’s concurrently throughout the thesis. By doing this, the data will be transparent and the reader will know what data is connected to the same interviewee.

E. Evaluation

The results of the literature review is evaluated based on its ability to answer RQ1. We analyze the qualitative data from the interviews by first transcribing the interviews followed by coding the data. The criteria are based on the results being able to answer RQ2.

5. Results

A. RESS: Requirements Engineering Strategy for Startups

To be able to represent the findings of our literature review the strategy will be represented as a model. The model consists of the 5 steps described in the following sections. The strategy is an iterative cycle which begins at the elicitation of the market needs and ends at the user validation of a prototype. The strategy has an agile approach which means it is supposed to aid an agile development without majorly disrupting or changing the practice. Time-to-market, traceability and changeability was the main focus when selecting the methods used in the model.

1) Elicit Market Needs: The elicitation of requirements represents an early but continuous and critical stage in the development of software systems [19]. Requirements elicitation is a recognized and appropriate activity to be the first step in the strategy. The RE practice for startup companies has to focus on searching and validating hypothesis concerning the user’s needs, focusing less on other stakeholders such as financial contributors if possible [3]. It is therefore important to work closely with the users during the developing process and put their perspective as the main focus. This is done by having continuous meetings and workshops throughout the development, in order to work according to E. Ries’s Build-Measure-Learn concept. This concept is described by Ries as "the fundamental activity for startups: to turn ideas into products, measure how customers respond and then learn whether to pivot or persevere" [1]. In the early stages of planning and development the company should strive to develop a prototype based on the conceptual idea of the product.

2) Create Requirements: After the elicitation phase a set of market needs deemed appropriate has been gathered and documented the first step of the strategy ends. The second step involves the creation of the requirements based on the elicited market needs. The requirements will be documented as user stories as per the agile methodology [6]. The user stories are broken down into manageable tasks which collectively reflect the requirements. The choice of the second step being “create requirements” stems from the fact that the market needs should be applied to the process and be feasible as soon as possible after they have been gathered. When the market needs are transformed into user stories the development team can start to work with them.

3) Prioritize Requirements: The stories should now be prioritized based on the market needs. The motivation for focusing on prioritization and including it as a step is the agile framework [6]. The backlog, containing all the market needs as user stories, is constantly updated and prioritized. This is done to ensure that the work flow is concurrent to the what is the most valuable to develop at the moment. Quality requirements (non-functional requirements) are not valued as critical as functional requirements in startups since it contradicts the importance of time-to-market [20]. The positive aspect of prioritizing time-to-market in an early stage of development is that a product could more easily attract attention from customers. Having good quality can never be bad, however the time spent perfecting a product (quality requirements) could have been more valuable on developing features (functional requirements). Depending on the feedback from the stakeholders the prioritization should be based on the functionality which would yield the highest product value at a specific moment in time.

4) Implement Requirements: The choice of including implementation as a step in the model is based on the ability to then find challenges and solutions for problems found in the implementation phase. The implementation phase should start with exploring and defining different outcomes in the lines of future directions for the company, with different costs [21].
The directions for the company influences design decisions made in the implementation phase and could affect time-to-market, interoperability and technical debt. If one direction presses on the importance of defined quality requirements (which could slow down the implementation process), an alternative direction should present design decisions for faster time-to-market.

5) Verification and Validation: According to Nuseibeh and Easterbrook [15], “the primary measure of success of a software system is the degree to which it meets the purpose for which it was intended”. Since the RE-strategy is a iterative process, V&V is an important step in the model in order to validate the requirements before the next iteration. The decision to have V&V as a step is based on the need for correctness to in the end of the cycle. As Bahil and Anderson states: “Verification and validation are continuous processes that are done throughout the development life cycle of the system.” [22]. Verification and validation are procedures used for checking that a product or system meets requirements and specifications and fulfills its intended purpose [23]. The purpose of the verification phase is to measure and test the functionality in place against the requirement specifications. Different methods of V&V investigates different aspects of the software tested. Therefore it is important to run tests that correspond to the requirements set for specific parts of the software. Three different aspects of a system should be considered: Separate functions - testing functional requirements individually, System testing - testing the system's ability to work synchronously (interoperability), and Non-functional testing - testing the quality and stress resistance [24]. As the first iteration of requirements and development has already been developed, even though it is not finished and will take. They can also estimate the value of what has been concluded a prototype should be available for users and clients to test. Sadabadi and Tabatabaei reasons that “...prototyping is most beneficial in systems that will have many interactions with the users.” [25]. As the system will have both user and clients the method of prototyping will yield results from both parties. The validation technique of prototyping can then be applied to the process of validating the product in its current state by either confirming or rejecting the proposed prototype. Evolutionary prototyping is advised in contrary to for example throw-away prototyping or incremental prototyping. With a low budget and time-to-market a throw-away prototype would be too costly while incremental prototyping suggests the product is developed as separate modules which are then put together. In contexts of high uncertainty, the evolutionary prototyping approach dynamically responds to changes in user needs and accommodates subsequent unpredictable changes in requirements, as the development process progresses [26]. The company will proceed to gather users and clients to allow them to test the product prototype and give feedback during a workshop [15]. The qualitative data gathered during these workshops is coded to present the guidelines of the markets’ needs. A single user might want a specific functionality while no other user agrees rendering the requirement unnecessary.  

B. Evaluation of RESS model

1) Elicit Market Needs: The challenges at Trovisio regarding the elicitation phase are C1: getting customers and clients in the targeted market to continuously test the prototype. N1 said “One of our biggest flaws has been misunderstanding what the market wants because of the difficulties of finding customers willing to test our product continuously.” The practice to handle the challenges of getting customers who continuously test the prototype are P1: caring for customers with respect in order to build a constructive relationship. To keep the customers interested and willing to continue giving feedback it is important to show that their feedback is considered. N2 said “If someone put in the effort of testing the product and giving feedback it is important to encourage them and show them that it matters. If we can give a customer a positive association to Trovisio, it is more likely that they will come back.”

2) Create Requirements: N3 stated in the interview that one of the challenges is that ”We started the project without a proper method for creating requirements.” N1 also said “The idea was that collective brainstorming would boil down into user stories, which didn’t really work. However, it became easier to handle and prioritize [the requirements].”. Grahla et al. identified an C2: unstructured practice to be the main issue in startups RE practice [5], Trovisio understood this and adapted their practices to P2: a more structured approach by using the requirement management software JIRA for documenting requirements. N4 said “The user-requirements are gathered by the sales representatives through discussions and meetings with customers and clients. The product owner presents the requirements to the developers and through discussions we decide if they are relevant and feasible.” This way they have a structured chain of producing the requirements.

3) Prioritize Requirements: The main challenge with respect to prioritization faced by Trovisio is C3: having an updated and accurate backlog. Since the product owner has meetings with customers continuously, the priority of user stories can change in the middle of a sprint to better suit the needs of a specific customer. N1 stated “If a customer has special requests or feedback that makes us re-prioritize, we sometimes do that in the middle of a sprint. We aim to not have to cancel an ongoing sprint, but sometimes we have to.” This is not ideal in the sense of C4: time management. It is a trade-off between the gains that can be made by prioritizing a certain customer’s needs and not having wasted time on the initial tasks in the sprint. In order to minimize the wasted time in the project Trovisio practices P3: close cooperation and discuss the different paths collectively. The developers can give input on how much time they have already spent on some task and how much time the newly requested task will take. They can also estimate the value of what has already been developed, even though it is not finished and
what the cost of re-prioritizing will be. The product owner can **P4**: evaluate the possible implications of implementing the new customer need and balance the pros and cons of re-prioritizing. **N2** said “We have always focused on what the customer sees.” and **N5** emphasizes the importance of having an updated backlog.

4) **Implement Requirements**: The **challenges** of the implementation is to **C5**: keep up with the pressure and time constraints. The development team must be able to deliver what the market demands while working efficiently enough to stay within the limited time frame. **N3** states “To ensure that we survive we have to keep the pressure high.”. The **practices** to mitigate the pressure and the time constraints is the environment in which the developers are able to work as well as the flow of information. **P5**: The flow of information from the market needs to the product owner and onto the developers must be active and constant. The developers must always know what they are supposed to do and the product owner must know why it should be done. As **N3** described about their practice “We [the management staff] handles the customer and client needs but the developers are solely in charge of how the implementation of those needs should be done.”. **N3** continued with saying **P6**: “We...” the developers must be independent.”

5) **Verification**: The **challenges** Trovisio presented in the process of verification is **C6**: the definition of done and acceptance criteria. The importance of documentation and testing is clear. If a task is not phrased with a specific definition of done, and the developers has not documented the code well, the tester can never be certain that a feature or quality delivers what it was designed to do. The **practices** Trovisio uses to mitigate the challenge of defining when a task is done is again, **P7**: a common understanding within the team. **N3** said “We check with the developers every day how close they are to meet the acceptance criteria of the tasks they work with.” With a continuous dialog between the tester, the development team and management, a common understanding of definitions, progress and acceptance criteria are shared. **N5** added “We are doing two week sprints, which is sufficient and effective for testing and verification.”.

6) **Validation**: The **challenges** in user validation stems from **C7**: the ability of the users being able to test a prototype or a mock-up, and give feedback. **N1** refers to this challenge “We need to go to customers and show them the application, we can’t just put up a poster on the bus. Therefore we have to build a prototype and focus on those parts of the application early on.”. **N7** discuss the challenge of **C8**: finding a proper instance of gathering continuous feedback from customers: “We have to **P8**: build something from which they can give feedback and a way to give feedback, like for example a
form or something [alike].” The practices focuses on a way of being able to test the product, early in the project as a mock-up and then as a prototype. As N3 states “We had a pair of thesis students who created a mock-up of the product [before we had a prototype]. We invited consultants and sales representatives [for consultants] who gave feedback on the mock-up. The feedback was positive which validated the product in that stage”. N7 describes P9: the benefits of the prototyping practice “We have been working with prototyping since we see it as the easiest way of getting feedback on the product. That’s because the user can use and test the product instead of just getting a pitch of the idea or the concept. Every time we do it [prototype tests with customers] we get a set of requirements to work towards.”. The experience of the team members within the business is a key factor in knowing which clients and customers are of value when it comes to user validation as well as having contacts to able to get in touch with them.

6. Discussion

In section 5.B “Evaluation of RESS model” a choice was made to include challenges and practices for both Verification and User Validation separately because of the large quantity of information gathered in the interviews on these subjects. Verification & Validation are in the same section of the model because it touches in the same area, but diverges in detail.

A. Threats to Validity

- The threat to the external validity stems from the fact that Trovisio is the only startup whom are part of the study. The generalizibility will be low and the challenges and practices could possibly only be applied to startups within the same field. The attempt in mitigating this threat is to do the literature review to create the strategy which then will be compared to Trovisio’s practice. The literature referenced has a broad sample size of startups among them in different fields, sizes and run-time.
- The amount of time available on this paper will not be sufficient to see if the strategy will have an impact or not on Trovisio’s or other startups’ practice or success, this will be a threat of internal validity.
- The interviews were of the semi-structured form and the order of the questions and structure of the interview might make the answers biased. We started the interviews with presenting our RESS-model in order to steer the interviewees into the domain of requirements engineering. We explained that the goal of the interviews were to identify challenges and practices enabling us to improve Trovisio’s current practice. In hindsight, presenting the RESS-model before asking questions might have lead the interviewees to answer the questions in a certain way. However, we argue that presenting our model without exemplifying challenges or practices, only with the purpose of structuring the interviews this is not a big threat to validity. To capture as much relevant information as possible we asked if there was any additional information that they wanted to add at the end of each interview.
- In order to gather as much information as possible the interviews were held in Swedish, since all of the interviewees were native speaking swedes. The questions were therefore translated before the interviews were held. This could be a threat to validity because of loosing concepts or phrasings in translation. In order to mitigate this we translated the interview guide individually and worked out the final version together.
- After the interviews were held and transcribed the coding process began by identifying ”buckets” of different categories relevant to the subject. Quotes from the transcriptions were put into these buckets and in order to not miss relevant information, each transcript was analyzed individually.
- Each quote used as a reference in the paper is translated from Swedish to English. The translation is as literal as possible while also understandable. There will always be a threat of validity of the meaning of each quote as they are translated and the mitigation was to not translated out of context.

B. Implications for Research

In this thesis, we present an RE strategy for startups and review a startup company’s challenges and practices. The result (RESS model), and presented challenges and practices at Trovisio could contribute to the research in the startup domain. Until now, there has been no attempts to develop an RE strategy for startups and our model could serve as a base for future research. Our results could help researchers to consider different aspects of RE within startups, but also other fields that are not yet researched within startups.

C. Implications for Practice

The results presents a strategy which can be used by startups to evaluate their current practice. Since only a single company was researched for the paper we cannot claim generalizability until further studies have been made. The challenges and practices presented can be used as guidelines while the method of acquiring the knowledge can be used to gain insight within the startup itself. Using the method startups can discover the challenges which could exist but has remained undetected. The RESS model presents the practices which are of importance in a healthy RE strategy and an emphasis on the importance of iterative cycles through every step of the practice. By following the strategy and iteratively cycle through each part of the practice the flow of information will be constant and up-to-date. With a market driven strategy the market needs will be of constant focus and the product can be a reflection of what the customers want and need.

7. Conclusion

A. Summary

An RE strategy, such as the RESS model, can guide and strengthen the cycle from requirements elicitation to user
validation. We found the focus in many of the practices to be communication between management and developers as well as between the company and the customers. A constant line of communication allows the work to be up to date with changes happening rapidly and priorities being shifted. The market driven approach deemed successful as it was proven to be the market needs which should be in the main focus according to our interviews. The time-to-market was also a factor but as our findings proved but the content of the product was more important because there must be a need for the product, otherwise it has no value. The findings of the interviews points towards a common understanding of the importance in creating a product based on the current market needs. Although, most of the other challenges relates to their field of work within the project. We notice that even if the common goal is clear, the challenges which potentially hinder them from reaching the goal differs. It is therefore clear that every part of the team must be aware of and take part of the practices which affects them in order to collectively follow the same strategy. The lack of structure in certain parts of the RE practice also give some claim to the need of a strategy. Some of these flaws occurred early in the project and were solved eventually but some of the issues has not been solved yet. A proper structure for requirement elicitation and user validation is something of interest to the responsible members according to the interviews. The indications of struggles with structure early in the project could be a reason to suggest that a strategy is useful and necessary for a startup. As Trovisio has the experience and knowledge necessary to succeed yet they still struggled.

B. Outlook

Further work on or with our thesis as background could claim generalizability for the strategy. We suggest two different paths for continuous work with the thesis. The first path would be to implement the RESS model at a startup company and analyze the results. Research the current practice and outcomes of that practice and compare it to the outcome with the RESS model. This could result in interesting finds and claims to its potential abilities of improving the RE practice. The second path we recommend is to continue the research on the topic with more detail and companies. By interviewing more companies, a clearer picture of the general challenges and practices among all startups could be found. The findings could help generalize the strategy and potentially claim generalizability which is the common goal because it could then help any and all startups.

REFERENCES

APPENDIX

Interview guide

Presentation - Olle & Oscar

Goals of the interview

- Can the proposed RE strategy help improve Trovisios’ requirements engineering practice?
- Get a deeper knowledge of Trovisios’ current RE practice.
- Identifying difficulties and obstacles
- Comparing Trovisios’ current practice with our proposed RE strategy.

Anonymity. We will use the data collected in the interview in our BSc Thesis but you will be anonymous.

Audio recording. Will you give us the right to record this interview?

Presentation - Interviewee

- Name
- Role - Responsibilities
- Experience - Within your role, the business and startups
- Education
- Amount of time in Trovisio?
- Which colleagues do you work most closely with?

RQ2: Can the proposed RE strategy help improve Trovisios’ requirements engineering practice?

Presentation of our proposed RE strategy - Show the interviewee the model and explain each step.

Generally about RE:
Are you familiar with the concept of RE?

- Yes: Explain your view of the concept of RE.
- No: Short definition: requirements engineering is a process where one defines, documents and implements requirements?

What models/methods within RE do you experience with?

- Has experience: Explain.
- Does not have experience: Explain Product-/Market-Driven RE

What RE methods are you using at Trovisio?

Have you used different methods during your time at Trovisio?

- If yes: Why have you chosen the one you are currently working with?
- If no: Why haven’t you considered using different methods?

Can you explain the different steps in your RE practice?

Can you explain how they impact your daily work routine?

Where should the focus be, according to you, in the proposed RE strategy model?

- Is Documentation/Flexibility important?

What are the differences according to you between our proposed RE strategy compared to Trovisios’ current practice?

- Similarities/Differences

Generally:
Market research