

Applying lean startup methodology to software startup : Case study- Company “X”

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<p>Startups are becoming more popular each year. New marketing tools and platforms are helping entrepreneurs start successful businesses in a short time and with minimum budget. Adding a lean methodology boosts startup productivity by focusing on product delivery on early clients therefore enabling GTM faster.</p> <p>In this product thesis we will see how the lean methodology works in mixture of hardware and software business. As an example, we will review a work done in a software startup in startup incubator from its start, half a year ago, till now, its commercialization stage. We will analyze all lean tools used for a lean startup and will try to see what went well and what challenges we faced.</p> <p>The result of this work showed us that application of lean startup methodologies have both negative and positive effects. Uisng this methods a startup can accelerate faster to productization and reach better market fit. On example of the Startup "X" it was proven that it is possible to achieve great results just only 6 moths starting from the idea to Minimum product in a team of two people.</p>	
Keywords Lean startup, software, challenges, benefits	

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1 Introduction

Many companies still struggle to remain competitive in today's vibrant and changing environment. Harsh competition drives companies to look for new opportunities and fundamentally develop new products, services, and business models. However, in most cases, companies cannot succeed because they are not suitable for finding or creating new business opportunities.

Over the past few decades, there have been many ways to tackle the challenges and innovate. In recent past, the Lean Startup methodology has emerged as a welcome new way to start a new product and service. There are already some attempts to demonstrate the applicability of Lean Start-up methods in different manufactory or commercial enterprises, including healthcare sectors, manufacturing or social and non-traditional industries. However, Lean Start-up has gained the more and more consideration in IT industry than any other sector. The application of Lean Start has been researched and evaluated in software, but not many are combined with hardware.

1.1 Research problem and questions

There is a lack of studies that determine the exact prerequisite criteria and regulatory characteristics on the basis of which software companies take initiatives to follow the Lean methodology. The application of Lean start-up in established companies has shown little influence of the methodology in these studies. It truly shows the need for additional research, especially with the illustration of real and practical model studies that strongly emphasize the influence of Lean Startup when creating new services by mixing hardware and software products.

Therefore, the aim of this product thesis is to show the real application of Lean Startup methods in the well-established company. A brief literature review of the intentions to obtain the benefits and challenges of the Lean start-up methodology application. Facts are extracted and organized to follow the specific Lean Start-up methods from organizational, technical, costumer and product development process dimensions. The objective of the Thesis is to create an analysis of how those methods were applied and what was the result in the case of software startup. Additionally, the thesis will present a set of endorsements to apply Lean Start-up methods for companies in IoT sector successfully.

Therefore, we can formulate following research questions:

1. What are Lean Start-up techniques most beneficial for software Start-up?
2. How to apply Lean Start-up techniques?
3. What are the benefits and challenges?

4. What are the propose suggestions or characteristics on how to successfully apply Lean methodology to IT Start-up?

2 Theoretical framework

Under this topic, all the studies and documented research performed in relation to the Lean Start-up methodology analyse to explain its procedure and effects on IT companies. Part 2.1 overview the innovation initiatives in a company environment, and part 2.2 explain the Start-up and the need for such methodology are further clarified with the explanation of its step of development. Part 2.3 presents a comprehensive overview of the Lean Startup methodology and analyses the company requirements for its application. And finally, chapter 2.5 opens up the selected set of methods.

2.1 Corporate entrepreneurship

Companies are those organizations that operate using the business model. However, to grow and exist, they are forced to constantly seek new business models and become ambidextrous (Garvin and Levesque, 2006). Ambidexterity is the ability to execute exploitation actions simultaneously. These are considered as viable and competitive benefits. However, pursuing the organizational ambition (to balance the activities of exploration and exploitation) is well-known for its extremely challenging effort. In the literature, exploration activities are defined as "technological innovation activities aimed at getting into new product and market domains". Continuing innovation defines the ability to recommence the organization and introduce new products and business standards ". It allows persistent innovation to look for services, novel products, and new business territories. For this reason, business entrepreneurship authorizes exploration activities to renew the company or create new business (Garvin & Levesque, 2006).

Mainly the exploration activities can be classified into two types, business renewal activities for existing businesses and innovation activities for the creation of new businesses. Renewal actions for existing companies are to try to transform/renovate, expand and configure in order to create new business domains. Innovation activities can be implemented into separate and the only division called Internal Start-up of Internal Company. Creating new businesses is not limited to corporations. Ries defines the term Start-up in the context that it is the human organization that intended to create novel products and services in extreme ambiguity ".

In sources, Start-ups are generally defined as external or outdoor Start-ups. However, Ries's definition of Lean start-up methodology is more elaborating to acclaim that this methodology can be applied to any field, industry, or organization regardless of its size. The environment in which companies are established is extremely uncertain (Ries, 2011).

This level of ambiguity depends on the type of start or phase they exist, which is different in each case. Internal Start-ups are supported by mother company thereby theoretically and comparatively; they perform in a less risky framework. The difference in the level of uncertainty a Start-up has to face depends on the Start-up stage. In the first phase, a Start-up must focus on exploration and innovation activities, taking into account risk, speed, flexibility, and experimentation. Experimentation is considered an effective treatment to reduce the risk of uncertainty surrounding business creation (Ries, 2011).

2.2 Start-up stages

Customer development is a four-step process: customer identification, customer validation, customer creation, and company building, as shown below (Blank, 2003). A Start-up must pass these four phases to evolve into a consolidated company, as shown in Figure 1.

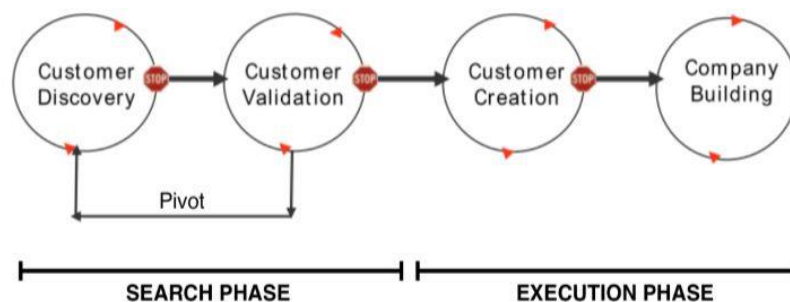


Figure 1: 4 stages of a Start-up development (Blank, 2003).

Blank expands the process of customer development into further two phases: the search phase and the execution phase. In the search phase (first-phase), a Start-up pursuit for a perfect business model for implementation along with products and services to sell. When the proposed business model is verified, the second-phase begins, in which a formal organization is established with the implementation of the suggested business model.

Customer discovery and customer verification falls into the first or search phase. The initial step in customer discovery is to understand the customer's problems and needs, and the second step is customer verification, with a focus on developing a replicable sales model.

Running experiments to choose a sales model to test how Start-up products and the services respond to the consumer issues and needs that identified in the previous step. If the customer is not interested, then Start-ups can turn to finding better business models (Blank, 2003).

The next is the implementation phase, in which Start-ups must start building end-user needs (customer creation) to expand their business. Additionally, Start-ups need to shift from short-term organizations, designed to explore business models into the structures that focus on implementing validated models (to build organization) (Cooper, 2010). Blank considers the need for product market must take place before going from the search phase to the final and execution phase (Blank, 2003).

2.2.1 Searching phase

The product market fit is a term that is defined as the process of designing a value proposition around services and products that the tasks, pains, and interests the customer (Ries, 2011). In fact, this method is divided into three levels: "problem-solution matching", "product market adaptation" and "business model adaptation."

Problem-solution matching happens when an entrepreneur finds relevant insights that can lead to a recommended solution. This occurs when there is a confirmation that customers care about certain posts, anguishes, and benefits, and there is a value proposition that focuses these jobs, pains, and benefits (Osterwald, 2014) If customers respond positively to value propositions then, the product market fit will start. Therefore, there is evidence which clearly shows that customers concern about products and services that are linked to their value proposition. The final stage, business model adaptation, which occurs with the implementation of a value propositions in a professional and ascendable business model after finding the evidence.

It is perfect to look for the three steps that meet the definition of Steve Blank. When Start-ups perform client discovery, the product-solution fit phase is complete. In Client Discovery, the goal of a Start-up is to understand the consumer's problems and needs and propose possible alternatives based on the outcome (Osterwald, 2014). Therefore, the product market adaptation occurs when the customer thinks it necessary to propose a solution. The final step (customer creation) is about creating end-user needs to extend the business needed to fit your business model. Therefore, this phase is recognized as verifying the value of the organization, while the product market is focused on verifying the value of the customer.

The most considerable argument is that the occurrence of product-market-fit is dependent on problem/solution and will not happen until its completion. The process of attempting to directly implement a product/market means ignoring the methods that must be understood in order to understand the problem that should be solved.

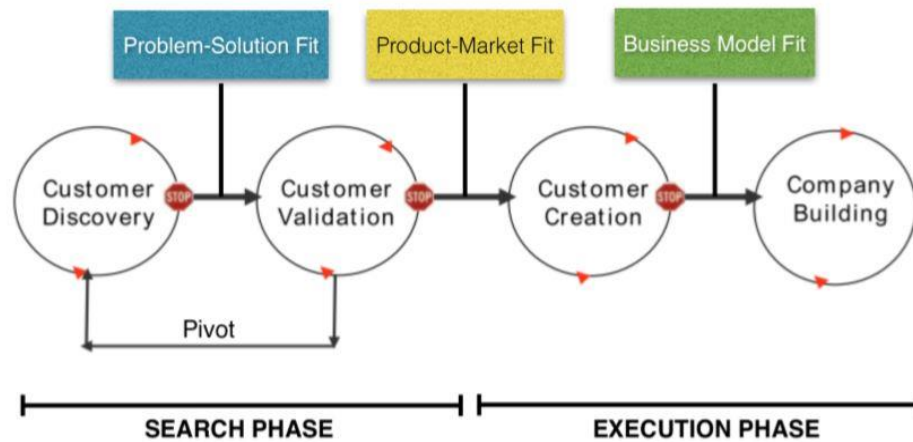


Figure 2: four stages of a Start-up improvement with the corresponding fit (Blank S. 2003)

2.2.2 Start-up Goal

A Start-up's vision is defining as what are the needs of Start-up to achieve or reach in the medium or enduring way. If Start-ups choose this vision, then it is the utilization of the system where the final item of the strategy appears as a product (Ries, 2011). It is believed that a Start-up is profitable when Product-Market Fit is achieved and is able to extend this success sustainably (up to a Business Fit model). When Start-up establishes and maintain its business within a single vision, it is said to be a successful Start-up.

It is usual that Start-up may encounter challenges of losing its assets immediately, therefore Start-ups need to utilize the two processes or methods. Firstly, the optimization method to modify or adapt product to get Product market fit and secondly, the orientation process, which determines that, to achieve preferred vision, need to replace or conserve the strategic changes.

Therefore, need for speed is the main focal point when it comes to the method of creating a start-up. To achieve the preferred vision, a Start-up must aim to explore and consider the sustainable business, as soon as possible (Ries, 2011).

2.2.3 Definition of software company

This work is based on the term "software company," referring to the established business for work in the IT industry. A Start-up and an established organization are two different businesses and will implement this vision differently since established organizations are already running business in the IT industry.

The literature denotes companies as "company," "organization," "enterprise," or "company." Likewise, the size of the organization (SMEs or huge companies) is not considered in this study. A more accurate term is to express "an established software company." However, the purpose of this work is to use the term "software company" instead.

In this study, we review the Start-ups of a large IT company focused on the B2B market-place. B2B software companies develop their own products and services, but their end customers are not necessarily other companies in the IT industry. In this case, in particular, a company has expertise in hardware design and experience building software services.

2.3 Framework of the Lean Start-up methodology

This division outlines the Lean Start-up methodology and evaluation of its principles, origins, and definitions. Additionally, in this section two groups of lean Start-up methods (steering and acceleration methods) were presented. Lastly, this part discusses the company characteristics required for lean Start-ups in software companies.

2.3.1 The principle of lean Start-up

To completely understand those methods, first we should check its five it's based on:

Principle 1: "Entrepreneurs are everywhere. You don't have to work in a garage to be in a Start-up. The concept of entrepreneurship includes anyone who works within my definition of a Start-up: a human institution designed to create new products and services under conditions of extreme uncertainty. That means entrepreneurs are everywhere and the Lean Startup approach can work in any size company, even a very large enterprise, in any sector or industry" (Ries, 2011).

Principle 2: "Entrepreneurship is management. A Start-up is an institution, not just a product, and so it requires a new kind of management specifically geared to its context of extreme uncertainty. In fact, I believe "entrepreneur" has to be considered a job title in all modern companies that depend on innovation for their future growth" (Ries, 2011).

Principle 3: “Validated learning. Start-ups exist not just to make stuff, make money, or even serve clients. They exist to learn how to build a sustainable business. This learning can be validated scientifically by running frequent experiments that allow entrepreneurs to test each element of their vision.” (Ries, 2011).

Principle 4: “Build-Measure-Learn. The fundamental activity of a Start-up is to turn ideas into products, measure how clients respond, and then learn whether to pivot or persevere. All successful Start-up processes should be geared to accelerate that feedback loop.”

Principle 5: “Innovation accounting. To improve entrepreneurial outcomes and hold innovators accountable, we need to focus on the boring stuff: how to measure progress, how to set up milestones, and how to prioritize work. This requires a new kind of accounting designed for Start-ups—and the people who hold them accountable.” (Ries, 2011).

2.3.2 The origins of lean Start-up

In the book: “How Today's Entrepreneurs Use Continuous Innovation to Create Radical Success”, Eric Ries explains that conservative management activities and ideas do not correlate with Start-up thinking. Rees found ways to adapt lean thinking to the entrepreneurial environment and recognize the relationship between the activity of creating value and waste. Therefore, Ries decided to use lean thinking for the innovation process. After its first development and improvement, Lean Start-up signifies the previous management and product development concepts as a modern approach to create continuous innovation. That includes design-thinking, lean-manufacturing, customer-base development and rapid growth.

2.3.3 Definition of the Lean Start-up

Eric Ries's book clearly communicated the Lean Start-up methodology as a method and enforces to stop taking it as a series of techniques or steps. The author also refers the term “method” to an exercise indistinguishably. Therefore, we outline the definition of Lean Start-up methodology as "a set of methods to help entrepreneurs to increase their chances of creating a sustainable and successful Start-up." First, educate entrepreneurs to initiate a Start-up through the Build-Measure-Learn. Secondly, allowing entrepreneurs to develop and grow their business (Ries, 2011).

2.4 The lean Start-up practises

The Lean Start-up method can be divided into two broad groups of methods: the steering methods, and the acceleration methods. As the name indicated the steering methods is to configured to decrease the overall time through the Build-Measure-Learn feedback loop, while the acceleration methods that permit Lean Start-up's scale without sacrificing its velocity and agility. The first set of methods must be implemented prior applying the second set of methods (Ries, 2011).

2.4.1 Steering methods

The steering methods enable businesspersons to analyse to direct (whether to rotate or proceed) in the most efficient manner (Ries, 2011). Entrepreneurs can theorize the proper pathway lead to and can check and gauge the development of the expectations they made that help them to make greater conversant decisions with the achievement of gaining valuable vision. This procedure is known as the Build-Measure-Learn feedback loop. Table 1 presents the listing of the steering methods.

Objective	Excercise name	Desription
<i>Hypothesize</i>	Leap-of-faith expectations	Risky strategical assumptions
	Escape your office	Chat to possible clients to verify the leap-of-faith assumptions
<i>Experiment</i>	Minimum Viable Product	MVP to asses hypotheses from actual clients
<i>Evaluate</i>	Innovation accounting	Scheme that measures the understanding to scale the business
	Actionable metrics	Metrics that demonstrate a direct link between the product development activities and the client response.
	Cohorts and split-tests	Deliver two versions of the product to two similar client groups simultaneously
	Kanban	Prioritisation of product development stories
<i>Learn</i>	Validated learning	Studing about hypotheses validated thru scientific research

	Pivot (or persevere)	Tool to adjust the way of product development and discover different paths
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Table 1 : Steering practises: Lean Start-up (Marc Salas Martinez. 2016)

2.4.2 Acceleration methods

The acceleration methods allow new businesses to scale and develop effectively, adapting the structure of the institute and its culture and developing a discipline of implementation to change to the established companies (Ries, 2011). Entirely, without any risk to the quickness, responsiveness and maintaining the innovation capability of a Start-up. Table 2 describes the acceleration methods of the Lean Startup methodology.

Purpose	Practise name	Description
<i>Measure</i>	Small lots	Reduction of lot size to hurry up the feedback loop
	Non-stop distribution	Automatic identification and elimination of product faults and re-deployment of fixed fragments
	Well timed scalability	Terminate production to fix a issues which would never stop production again
<i>Develop</i>	Engines of development	Mechanism to recognize the sources of continuous growth
<i>Adapt</i>	Five Whys	Source origin analysis that stops upcoming process difficulties
<i>Innovate</i>	Start-up team building	Self-autonomous and cross-functional groups with secured minor capital and self-regulating authority
	Platform for innovation	Secure space of operation with its own procedures and without limitations from the parent company

Table 2 : The acceleration methods of the Lean Startup methodology(Marc Salas Martinez. 2016)

2.4.3 Client Improvement and Lean Start-up

Two lean methods (acceleration and steering) plot perfectly together with the four stages of a Start-up defined by S. Blank's Client Development process, and the two stages (execution and search). The examination phase, that includes Client Validation stages and Client Discovery, correspond to steering methods. The aim of these two phases is to endorse that when a worthwhile problem occurs for which solution is suggested to resolve the issue and customer valued the solution (Osterwald, 2014). Therefore, the converging point is to pursue and find a company that could flourish and becomes sustainable (Osterwald, 2014) When the product-market fit was attained, it's the right time to assess worth for your organization. On the other hand, we've got the execution stage, with Company Building and Client Creation. The objective of the 2 phases is to create the company workable (profitable and scalable). Figure 3 shows the Lean Start-up methodology's mix together with the Client Development process.

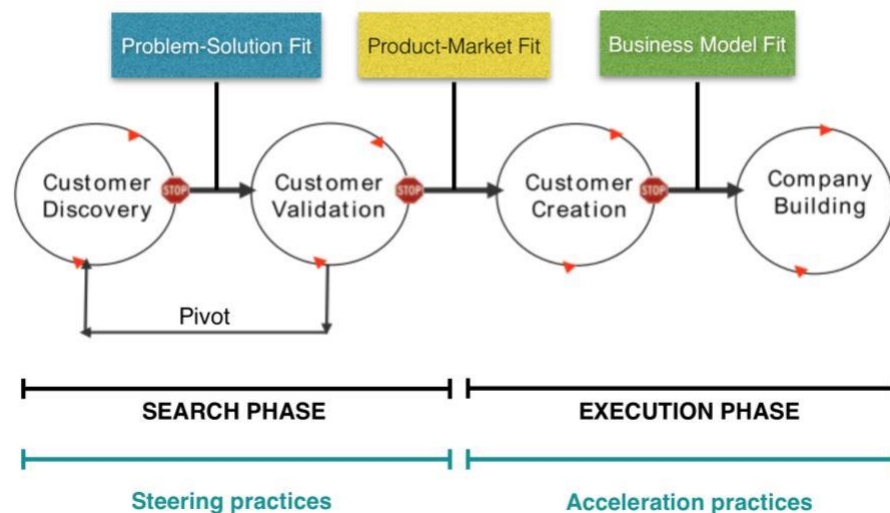


Figure 3: Lean Start-up methodology combined with Client Development (Blank S. 2003)

As mentioned above, the thesis signifies only on the required Lean Start-up methods that find-out and establish a business opportunity within a software company. That required methods are the steering methods that must perform before scaling the business. Additionally, as software companies are considered as established businesses, the successive part of thesis includes the suggested Lean Start-up methods that are helpful to bring innovation to an established company. Next sections overviewing the steering methods and its advantages and problems are discussed in deeper.

2.4.4 Lean Start-up requirements in IT

The Lean Start-up method in a company provides an organizational, cultural and disciplinary structure to manage the expansion search while maintaining its effectiveness (Ries, 2011). In addition, the use of the methodology in existing processes requires that the implementing company adapts the methods to the company's current culture and procedures. Lean Start-up defines the formation of self-employed work teams and full-time multifunctional teams that have a lower secure capital (Garvin, 2006) The management is required to not reduce the speed of learning and the responsibility by the need for meaningless approvals that slow down innovation (Ries, 2011). In corporate business writings, the figure of a leader is often exposed. However, Lean Start-up is not supported with the requisite for a leader or not to control the development group; in a sense, it suggests that top supervisor provides full support for the construction of team structures as discussed above. Lean Start-up support the formation a "platform for innovation", which possess its own set of guidelines that work in a predetermined manner and allow limits to promote the impacts of beginning the business without limiting Start-up methods (Ries, 2011). Another important requirement is the need to transform the company's culture. To encourage creativity, commitment, and passion, top management has to install a more advanced culture and welcome the change among its workers to develop in an enduring learning environment. As a result, the Lean Start-up method recognizes the need for a transformation of workers' and management's mentality into a management thinking that strives to balance exploration and exploitation activities (Ries, 2011). E. Ries suggests that the senior administration should bolster the innovation groups by doling out full-time employees to groups as opposed to isolating their duration of a task into different projects.

This can be happened by applying innovation accounting to explain further benefits and accountability goals and employees who are delivering have the autonomy to proceed with the product or stay behind for another venture (Ries, 2011).

2.5 Steering practises

This section consists of four steering methods of Lean Start-up in further detail including their effect on software companies. The standard methods are the Build-Measure-Learn cycle, Life Minimal Product, and Accounting Innovation. The various methods are based on the following:

1. Build-Measure-Learn feedback loop includes the steering methods. Thus, It is very important to get the clear understanding of this technique.
2. This thesis suggests to contact the clients early. Thus, escape from the Building method is reasonable to represent the steering methods that are used to hypothesize.
3. Thus, we select it to explain a crucial element of the steering methods.
4. The invention accounting method combine other methods like metrics, cohorts and split-tests. It's considered that the level of information of innovation accounting is sufficient enough to perceive the purpose of the steering methods. Thus, we select the steering system used for assessing the Client behaviour to be represented by this method.
5. We don't involve the steering methods to learn for example validated learning and pivot. Thus, we select the method to analyse that prompt the desired goal and objective.

2.5.1 The Build-Measure-Learn method

Build-Measure-Learn is a method that entrepreneurs can use to learn how to approach the Start-up view and "when if you need to modify a business strategy (pivot), or if the Start-up should continue on track." (Ries, 2011).

The Build-Measure-Learn feedback cycle is a constant and repetitive procedure centred on the scientific research. Each repetition of the procedure consists of three phases, illustrated in Figure 4

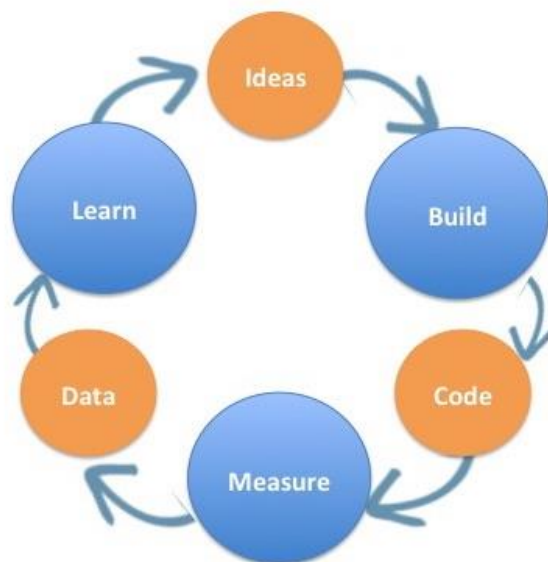


Figure 4: Build-Measure-Learn method(E. Ries. 2011)

Build stage. During the build phase, new businesses use the product as a test to check their assumptions about customer behaviour. This type of experiment, called Minimal Viable Product (MVP), is intended to quantify its effect on clients (Ries, 2011).

Measure stage. In the measurement phase, businessman obtains qualitative and quantitative data by measuring the interaction of consumers with the smallest feasible product. Entrepreneurs can use a quantitative method called innovation accounting to determine if product development and work is progressing well. (Ries, 2011).

Learn phase. Entrepreneurs utilize the information acquired during the previous phase to affirm or invalidate the speculation with the minimum viable product test and also utilize this learning to figure out the appropriate choice with the current marketing strategy or change (Pivot) and ensuing Test the next iteration (Ries, 2011).

First, "entrepreneurs must figure out what they need to learn." Second, "fix what needs to be measured to see if we've learned effectively." Finally, "Fix the product we have to work on to route the investigation and get the estimated results." (Ries, 2011).

Build-Measure-Learn process is showing a big difference between the first and last iteration. The first iteration was considered by interpreting the revelation as a business scheme, the last iteration appeared and validated by the first MVP. This does not happen in the following iterations. Starting from this idea, the emphasis is on improving the product and continuing to identify the proposed strategic point of view until there is a reasonable thought with respect to whether to proceed or change the arrangement until there is a clear idea as to whether to continue or change the plan.

Lean Start-up involves quick learning methods. The importance of learning and speed is widely mentioned in the sources. Ries reported that speed learning is a competitive advantage. He emphasized that the mentoring approach was intended to limit the time spent on the Build-Measure-Learn feedback loop (Ries, 2011).

The Build-Measure-Learn approach diverts the attention of these responsive techniques to software companies, from solution-oriented to customer-cantered.

This approach provides a software companies high-level capability to assess and develop the actual consumers need which they most valued. This highlights the prominence and presence of consumers in designing new services or products.

2.5.2 Theory practises: Get out of the building

Lean Start-up practice points out that entrepreneurs should translate business ideas into internal strategies based on assumptions. In the first iteration, entrepreneurs need to focus on choosing the two most important assumptions related to the leap-of-faith: the value assumptions and the growth assumptions. "The value assumption checks if the product or service actually provides value to the customer once they use it, and develops to accept that checking for new customers will find the product or service" (Ries, 2011).

Before progressing on to the next phase of the process (building and testing assumptions), Lean Start-ups recommends using GOOB to confirm expectations are based on reality. The term "Get out of the building" (GOOB) is mentioned to indicate that new organizations need to escape out of their working environment, chat with prospective customers, gather details and recognize customer problems and needs. (Blank, 2003). The first contact with a client can be used to plan a temporary client model to guide up-coming decisions and to choose which assumptions require more testing. (Ries, 2011).

2.5.3 Testing method: Minimum Viable Product (MVP)

MVP is the minimal product that's not limiting its successful implementation. MVP concentrates on minimizing the time duration to learn the set of features that discourse the customer requirements. E. Ries uses the concept of MVP to materialize (into product characteristics), trial (quantitatively) and find a solution for the invalidate business hypotheses obtained from the real clients (Ries, 2011). The MVP has already been shared in the literature. Firstly, an MVP is the minimum version of the product that is required to advance in the feedback loop that is Build-Measure-Learn. Consequently, it turns into important component to traverse finish the Build-Measure-Learn procedure with the minimum time duration and the minimal amount of energy. The results of the feedback loop are authenticated information. The approved information is proficient in measuring and gathering data from the customer communication with the MVP (Ries, 2011).

An MVP need to quantify its effect on prospective customers. For this purpose, an MVP consists of metrics to collect client feedback and data. They ignored that an MVP gathers client feedback thru metrics. It is essential to highlight that an MVP is a test. So, the feedback gained from customers with an MVP is quantified via metrics. This is one of Lean Start-up's principal points, that, in addition to qualitative learning, it does testing to confirm if the learnings are right.

An important element of MVPs is that it could be seen as a product that is unfinished. Early adopters rather than the typical clients evaluate first products. Early adopters are customers that agree to try unfinished products and willing to be the first to test it, therefore, these clients agree to pilot incomplete products. Moreover, an MVP starts the learning process. Therefore, an MVP is known as the first test that evaluates the Client behaviour. In fact, MVP doesn't stop the learning process but continues to learn from the next iteration.

There are three threats related to that. The layout specification could become waste of time if the designers did not completely understand the client wishes well enough, or there were errors or the market transformed. Yet, that is an MVP's advantage that is able to validate a product via Build-Measure-Learn feedback loop's, instead of developing a product that entrepreneur believes would work. E. Ries claims to question each area of the product and strategy when building an MVP, in addition to its value and design elements. MVP should be used to "learn what attributes clients care about" instead of wasting efforts in enhancing its quality (Ries, 2011)

2.5.4 Measuring: Innovation accounting

Innovative accounting is a less understood method. Accounting is designed to show that an employee or manager is working as planned (as previously recorded). Nevertheless, E. Ries claims it is hard to estimate the expected outcome of a non-existent product. On the other hand, innovative accounting is used to quantify this learning process, a process that is sustainable (Ries, 2011).

This quantification is prepared using actionable metrics that show that marketing, design, and engineering replicate certain customer behaviour. Obtain operational metrics by performing split-test experiments and group-based metrics. Separation testing is a lean business practice to adapt to product development marketing methods. The method involves dividing the customer into two similar groups, providing two versions of the product (split-test experiments) simultaneously to each group and measuring the effect of the change (based on the group's metric) (Ries, 2011).

3 Case Study: Company “X”.

In this section of the thesis, we will review a software startup inside the big mother company. Here we will feature its incubator department and perceive how the Lean Startup method functions in enormous entrenched companies and why such department developed. This chapter will include the description of the startup and story behind it.

In the following segment, we will survey how different strategies were connected to this startup, what challenges it faced during its incubation period and what were the benefits of applying these methods to software startup.

3.1 What is a startup incubator?

Business Incubator is a company that helps start-ups grow by providing services such as management training or office space. The National Business Incubation Association (NBIA) defines a business incubator as a catalyst for regional or national economic development. NBIA publishes member incubators on the following five incubators: academic institutions; non-profit development companies; for-profit property developers; venture capital firms, and combinations of these.

Business incubators, unlike research and technology parks, are dedicated to startups and early stage companies. On the other hand, research and technology parks tend to be large projects ranging from business, government or university labs to very small companies. Most research parks do not provide business support services, which is a hallmark of a business incubator program. However, many research parks have incubation programs.

Unlike many business assistance programs, business incubators do not serve any and all companies. Entrepreneurs wishing to enter business incubation programs must apply for admission. Acceptance criteria vary by program, but usually only those that have a viable business philosophy and a viable business plan can be accepted. It is this factor that makes it difficult to compare the success rate of hatched businesses with the general business survival statistic. (https://en.wikipedia.org/wiki/Business_incubator#Overview)

3.2 Description of the business case.

The thought behind that project is an absence of sensor management tool and high costs of installation and management of sensors. Since sensor market is shifting primarily to wireless technology, these problems are confronted broadly when attempted to start IoT businesses since that add additional significant cost to “mined” Data.

By the definition, a sensor is a device, module, or subsystem whose purpose is to send information to digital components a computer processor and to detect changes or events in its environment. A detector is always used with other devices, simple or light or complex, like a computer. (<https://en.wikipedia.org/wiki/Sensor>)

3.3 Stage 1: Problem Solution fit

This startup was initialized half year ago – in March 2017 with the team of two persons: Senior Developer and Sales. When starting this idea developer already knew that these problems existed. All this information where collected thru market research and personal experience of the team.

Sensors were installed with the papers, in an old-fashioned way. The process was certainly slow and installed by the engineers which cost around 70 euro/hour. The problems where speed and cost during the installation process. But the biggest problem was the maintenance of large sensor networks. Senior Developer had experience for couple years in a large IoT company and already knew all the troubles companies experienced. Next challenge was to create a tool that would actually monitor constantly sensor network, able to analyze possible problems and automatically offer a fixing solution for a maintenance company to speed up overall service management of sensor networks.

At the moment, the market does not offer complete service of sensors and we observe a clear opportunity creating it by using previous knowledge gained from other companies. Startup incubator also stated that the problem definitely existed and there is a need for such a solution. Using their experience and gained knowledge, a Value proposition fas created as seen in figure 5.

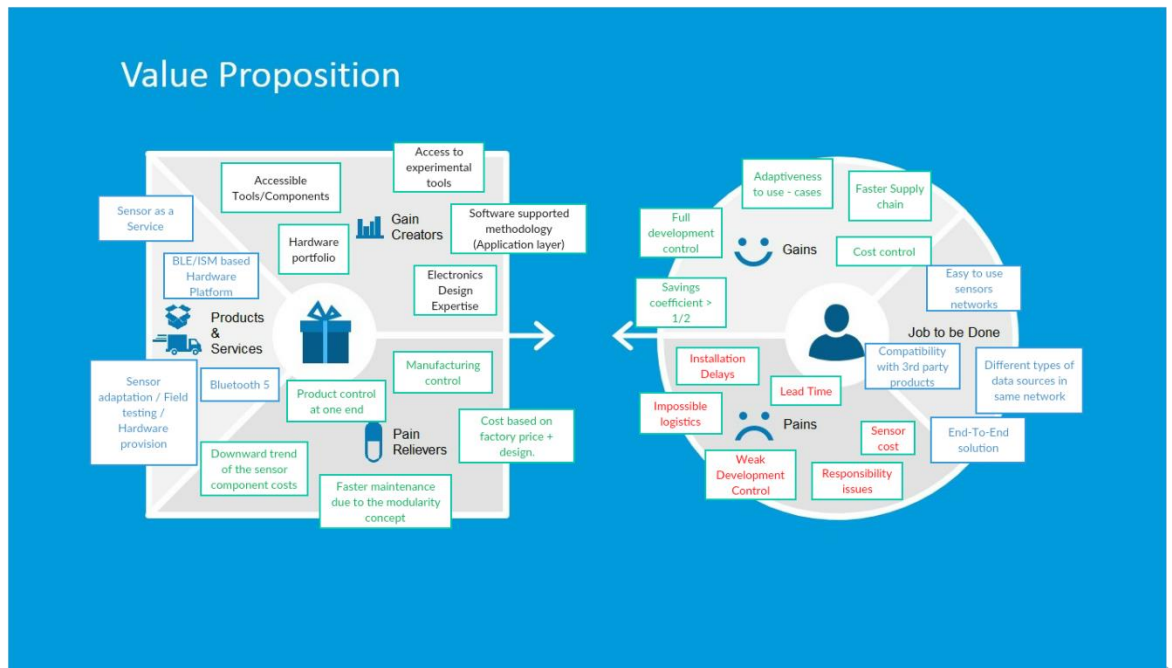


Figure 5: Value proposition: startup “X”.

3.3.1 Lean canvas

The lean canvas was developed using using value proposition. It focused on business plan. The major three problems were identified during the market investigation. Firstly, lack of standardization in sensor management tasks. They is no system that does maintenance of sensors effectively and fast. Implementation of different sensors to one system is practically not possible or very costly. Secondly, the upfront investment for any Data driven project is quite huge due to the installation and integration costs for the sensors. Another problem was the lack of full solution which will provide all the steps for the successful and fast implementation of the projects. At present, generally the development of one project related to data can take up to one year before you can actually install and test pilot.

The solution would be a unified platform which will support different sensor manufacturers and different communication standards to automate installation and management of sensors. While communicating with different customers, startup confirmed that the companies needed the solution, but actually there isn't any company existing which provides that complex product, at this moment.

Startups core value proposition would be a deep knowledge and experience in building high-dense networks and automation of installation and maintenance processes using machine learning with unique algorithms. Another value is supporting all possible sensors from different manufacturers, so customers can choose what kind of solution they want.

Customers were divided into three main groups: primary, secondary and optional. That would mean that primary customers will be those who actually lack experience in sensors and will require a full service usage. This customer will be charged with monthly revenue per each sensor, where startup is able to fully control the supply chain. Secondary client group will only use software solution for their existing sensor networks and get charged a monthly fee for using it. Optional customers could be those less attractive who are looking for expertise and helping them to set up sensors using our knowledge.

Creating partnerships with sensor providers could be an additional revenue stream, as it will add a value for product and therefore create automatically offer or solution for customers as seen in appendix 1.

3.4 Stage 2: Applying steering practices.

The Search phase was surpassed very fast as there was a clear understanding of market and problems. In fact it was skipped and startup moved straight away to execution phase. This chapter will overview the application of steering practices on the startup: challenges and benefits of each method.

3.4.1 Build-measure-learn: challenges and benefits

Benefits

The Build-Measure-Learn loop has positively influenced the customer, the product development process, and the start. First, Lean Startup benefited from the customer's point of view. Using the Build-Measure-Learn process, client was put in a central role, enabling observations, interactions and learning from him. The closeness with the customer has enabled the startup to increase the understanding of their customers. In addition, it was easier to collect customer feedback. Another advantage was that creating a large database and understanding of their problems gave startup a number of customers when launching the product or service on the mass market. Finally, as a partner of the contractor, startup were able to approach the customer's business and take advantage of a more strategic position.

Second, the most important advantage of the product development process is that it adds validation to the process. This addition had many positive consequences that resulted in further benefits. First, there was a clear understanding that decisions were based on data

and, accordingly, the process was more precise and faster. Using validation, startup focused their resources on creating features that increase product value and have a greater impact. By using the Lean method, it have been able to reduce the time and money sources and reach the right product/market in just six months.

Challenges:

Creating a culture of innovation within a large company is not without challenges. In particular, startup encountered some resistance from top management. The senior management team did not want to hurt their companies and markets. This is why there was a limit to the innovative potential limiting innovation within the business strategy. However, there was understanding that senior management prefers to sponsor technology rather than the startup. The transition to a culture of experimentation also affects the outside teams. Another organizational challenge in implementing Lean Startup is the lack of familiarity with Lean Startup practices. Other teams, such as the law department, were really slowing down the progress because they were not familiar with the product and the creation of pilot documentations took nearly 2 months.

When using the Build-Measure-Learn tool, startup faced some challenges in product development. The lack of clarity in anticipating hypotheses or expected outcome hindered the ability to learn. In addition, the company's bureaucracy had a negative impact on the process since it had to confirm most of the decisions they have taken. The biggest problem was communication within the company, as it was slow and automatically reduced development speed.

3.4.2 Get out of the building practice: Benefits and challenge

Benefits

The startup clearly benefited from early contact with potential customers.

Firstly, early validation with genuine customers allowed to make the right questions to put up or hypothesis to validation. It started with the idea of implementing hardware and startup was sure that they would be very interested in that part mostly, but during validation, they did not realize that just having hardware does not allow them to scale fast. Decision was made to focus more on software and try to outsource partners for hardware provision. Likewise, it helped to identify what original plans were wrong. Finally, initial customer feedback helped to understand clearly the needs of the market and customers and therefore establish MVP development plan properly, which was based solely on the preferences and client features.

Challenges

There were also challenges startup encountered with GOOB practice. From the company's point of view, there were certainly structural and cultural challenges. Since this practice required meeting real customers, it was necessary to invest money in this. To minimize investment in that, it decided to focus on the Helsinki area to minimize travel costs. This choice also had its negative effects, since it was not possible to find a company that would benefit from the minimum product at this stage of the IoT market development. This could affect the outcome of the project and, in some ways, provide incorrect data for the customer metrics. But if startup is able to find 1-2 customers in Helsinki it would be possible that they could get 10-20 in Europe.

On the contrary, startup had some fears to approach directly to real customers. Since internally there was no sales experience, led to idea to poor sales and presentation of the product. A big mistake was made when creating a first sales presentation that actually looked like a startup is raising funds instead of trying to find partner companies to pilot the new solution. As soon as it was resolved, it automatically boosted customer metrics and gave right data to evaluate.

In the end, it realized that the problem is that customers do not really know what they want. Therefore, startup tried to focus on the analysis of the interaction between their product and the customer.

3.4.3 Minimum Viable Product (MVP): Benefits and Challenges

Benefits:

An MVP has had a positive influence on client interaction with the product, on the product development process and on other aspects. The product development process enhanced from MVP due to its capacity to build the minimal product to confirm the hypothesis. Using MVP, startup were able to create a list of activities based on customer requirements, avoiding unnecessary efforts to create features based on unproven hypotheses.

It has helped to establish a starting point for improving the product. Additionally, testing MVP with actual clients (first users) has allowed them to get feedback from customers. In B2B, where the manufacturing procedure is proven to be slow, MVP has helped startup to capture customer feedback, quickly expose new features and adapt quickly. Moreover, it

was able to create a customer base of about 100 businesses that might be used for MVP testing.

Ultimately, the product would reach production to the mass market, it would ensure that fitting marketplace could be easily achieved as the MVP were build based on customer experience.

Challenges:

In most cases law requires companies to register for patent rights after they have rented the product. Because MVP is not the end product, this enforcement may hinder the product innovation process. Additionally, pitching an idea and showing it to potential customers without patent where putting startup to risk of losing a chance to be the first on the market and overpass competitors. However, the idea of competitor's stealing is unfounded because their challenge will be to learn faster than the entrepreneurs which are developing the idea. From a software developing perspective, rapid changes in characteristics of the product increased investment in development and in other cases a startup would not be able to meet target budget. However, management clearly saw the market potential and acquiring a debt in development seemed an investment that would be covered after payable customer would be found.

3.4.4 Innovation accounting: benefits and challenges

Benefits:

During the product development, it was hard to know which product features to prioritize. However, innovative accounting helped to identify activities that create value. In fact, metrics provided evidence that supported entrepreneurship learning. Applying innovative accounting methods helped to set learning milestones. Startup have analysed the data and verified the learning until a milestone was reached. During this time it have always learned something new and investigated new futures for the product development.

Continuous interaction between the product and the customer promoted better customer behaviour understanding and better accountability to the customer. The most important thing is that the metrics collected helped to analyse and support customer learning. Learning milestones allowed startup to objectively and accurately assess thei progress.

Challenges:

Innovating accounting made product development process more complex, costly and time-consuming by using split-test experiments, since that duplicated the number of metrics

needed to supervise each variation. This added complexity to the overall process, however, it improved overall learnings.

4 Recommendations

This part of the thesis will set recommendations which could help future software startup to possibly overcome the challenges that startup "X" faced. Using those recommendations, other software startups will be able to predict possible problems, therefore decrease the time required to scale up and set up a successful business. Recommendations will be divided into 3 sets: organizational, technical and product development.

4.1.1 Organizational suggestion

First of all, when working in a team each part of the startup team should be always in contact and apply changes to any aspect of the product if that is required by metric results and constantly learn each other. In fact, in a lean startup it is good when for example a salesperson knows all about development processes. That means the customer interaction in a B2B segment is greater. A salesperson will be able to understand what problems need to be solved for the customer and able to suggest if it's possible and how it will work. In the conclusion, it clearly expresses that any person in a lean startup should be agile and able to teach his teammates to increase overall efficiency in a company. To be sure that startup is on the right path metrics should be constantly used in aspects of the startup from the beginning, to understand the value, confirm that the vision is right. In addition metrics help to check achievements and set new milestones that should be followed.

When starting a startup inside the big mother company it is always a question whether or not to use mother branding. This should be solved right away. A startup should set to clear the barriers of how much they can use the brand name. In some cases, it is good to mention a support company during interaction with the client, as it gives some kind of a belief that this product will have a better chance to get productive and show the better result. Of course, that indicate the less money and time investment risks for the client. On the other hand, using big brand name too much could actually damage the brand name. Finally, for successful implementation of the Lean Methodology, a company should change internal mind-set towards innovation and learn culture to speed up the processes and avoid delays when solving unnecessary questions and getting permissions.

4.1.2 Technical suggestions

Any software development is divided into two parts: front end and back end. The front end part is one which concentrates on the final user and his experience. The backend is more for internal use like developers and engineers. It is highly suggested that a software startup would systematically do metrics for this both parts and combine them. Metrics would set the right milestones for the MVP development to ensure that the product will be built according to client suggestions. This will help to eliminate potential development risks and faster progression.

4.1.3 Product development suggestions

During the whole process of the product, development startup should be always interacting with the customer, collecting data and learning from it. Validation of the data is important during the whole process. Customer interaction is the core of the Product development process and without it, it is not possible to apply lean methods to the project.

5 Discussions

This part will evaluate the overall experience Company “X” gained from lean startup methodology and expose how startup achieved milestones and product overview will be presented as a result. Additionally, it will overview future plans for the startup.

IoT market is growing rapidly and expected to reach full potential by 2020. There are many companies who are developing hardware but not supporting or not having any experience in software and another way around that a software company is struggling to choose the best hardware for it and lacking expertise. This state is normal for a developing business. There is no standard in communication, hardware, and software.

When a Data dependant company (the company which analyses data to create a product or adds value to existing one) want to enter this market it usually faces a big problem in managing and building infrastructure and supply chain for their product, which leads to higher upfront investments.

Another big issue is the support and management of the new technologies. There are many factors which slow down the R&D process in the company, which is again caused by lack of standards in this field. This startup was created to actually solve both this problem by creating standards in installation and sensor networks management to accelerate the

development of the data acquisition process. During the process of the study, few assumptions were created and then tested with potential customers.

The decision was to take different groups of customers and interact with them during the full process of the product development. Gaining and analysing data from the customers was most challenging. First of all, searching and approaching of B2B customers is in a way quite difficult process, especially in such a young market. On the other hand, it is very easy to gain data as all of the clients are really looking into the new solutions, and there are no such a company providing similar services.

During the development process, startup have pitched idea to many different clients from different sectors and most of them got familiar with the idea on its early stage. Searching leads were done mostly thru the Linked In and events. Both this options worked quite well. There was the clear understanding that not many companies are familiar with lean startup methodology and it was sometimes a surprise for them that startup is pitching them just an idea, with no proof of concept or demo. With each iteration the vision was polished and changes applied, which helped to scale up faster and avoid unnecessary development. In just 3 months startup reached the final point and clearly set up final vision. If we compare it to the starting point here are the biggest changes, startup made:

1. First of all, changes were done in the main business model, shifting hardware core with the software support to software core with hardware support. That showed that scaling up while using outsourced hardware will be faster, because hardware development is much harder, and iteration taking more time than in software. Designing own hardware would also increase competition with established sensor companies.
2. Another reason for shifting 100% to software was the overall vision of the mother company. Incubator is completely software company specializing in designing services and consultation and have not worked with hardware at all. If there would be own hardware production involved, it would require more liabilities and investments to be included and failure with the hardware would damage the overall brand name.
3. To increase the potential of the product it was decided to start supporting other sensor companies and help them to build the missing connectivity and software part and therefore sell this. The packages and possibly makes additional revenue stream from re-selling partner sensors. That change was again caused by the result of customers interaction. Data analysis showed that in some cases customer want to use their own sensors, or already have sensors installed which lack management.

As soon as defined defined those core assumption and confirmed them using validating learning and metrics, it proceeded to MVP development. Development took only 2 moths using external company from Estonia since it was cheaper and faster than using internal

resources. Again startup followed followed lean idea and used all possibilities to cut down expenses and meet budget expectations

While MVP was in development there was constant communication with the clients and metrics done on the front end and back end. The product will be discussed further in the result section. At the moment startup is running field test with 2 different customers and POC will be prepared according to the results.

5.1.1 Product as a result

As a result of 3 months long research and running iterations, development team created a platform for sensor management and. The main idea was to make the product easy to use as possible so that any user would be able to learn it just under an hour.

The front end is very user-friendly and can be accessed from any device: laptop, tablet pc or phone. A user has to perform 3 simple steps: Login to the system, upload the plan and install sensors. This could be an open city map or for example buildings or even plan of some complex device or machine. In appendix 2 we have chosen one floor from a large building for the showcase.

After that user(let's assume its installation person) will just identify the right type of sensor with first 2 letters of unique sensor ID and will drag and drop it on the uploaded plan. After that, user confirms installation and sensor are becoming green that means it is connected to the cloud and data is received according to the pre-loaded settings.

In addition, a user can see a basic info of the sensor in real time as can be seen in the screenshot in appendix 2. As a result, the installation costs using just an MVP was cut down by half. That was achieved with new installation process where the speed of sensor deployment doubled. Additionally, there was no need for use expensive labour like the engineer as seen in figure 6, because process became very simple.

Sensor supply chain optimization

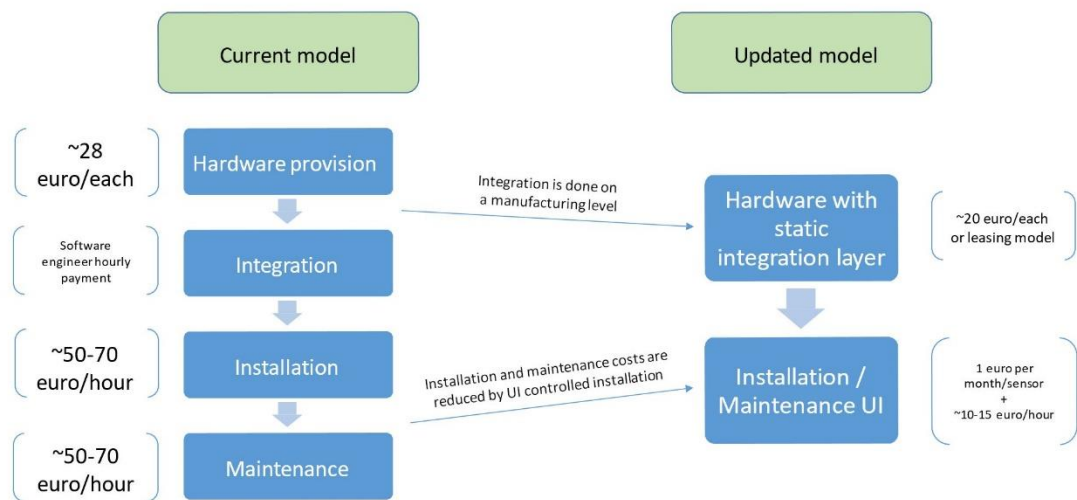


Figure 6: sensor supply chain management.

Backend, which is intended for developer and engineer usage is more complex. Unfortunately, due to the company regulations, it is not possible to get information about that as it is protected by NDA policy. Features that could be mentioned are machine learning algorithms, possibility to control the different type of users and give them different permissions and possibility to see more sensor data.

Next step after completing a POC with pilot customers is to find 2 payable customers and productize current solution thru events and internal awareness. Product development will increase and by end of the next year, it should be fully automated offering customers a 100% functioning platform with wide possibilities for sensor infrastructure management.

6 Conclusion

This thesis was performed to analyse the actual application of the lean methodology to a software startup inside a big corporation. This case-study focused on how to apply different methods that were presented in the theoretical framework. Different practices were examined to define negative and positive effects on software startup. Additionally, a set of recommendations for each method discussed that could help future start-ups to avoid effects. This productive thesis highlighted the full journey of the startup with lean startup approach for half a year, starting from the raw idea to real MVP.

In the theoretical framework part, we learned most common sets of practices with lean thinking to build a reliable and scalable business in a short time. This work only overviewed best practices - from a larger list - that can be applied for the software startup successfully. During its journey, a startup faced some challenges, as this methodology is not 100% straightforward and requires adaptation to different circumstances.

The major barrier to lean startup implementation was organizational issues. In most cases changing a company culture is challenging as employees are not familiar with the method and its right application. Results showed that mastering Lean methodology is not an easy process and requires a lot of effort and time to learn it. It is very crucial that clients and employees inside the company got familiar with it and not slow down the innovation process. A lean startup usually lacks internal communication with other teams as it solely focuses on the learning and development. Continuous learning and development is the core of the methodology to achieve greater results at an early stage. As we saw from the result of the Company "X", startup managed to set a strong vision, create a customer database and build a strong MVP based on customer needs. This case has proven that this method works great for software startup and its worth changing of the internal mind-set of companies towards innovation thinking approach.

This thesis has established that it is worth to interact with customers in the early stage of the idea and constantly improve the vision and product. It is clear that the top management team in customer's company should be following innovation thinking to accelerate development of the product.

It has also proven that metrics are the key to product development process and setting new milestones. Qualitative and quantitative validation improves the precision and speed of development.

On the other hand, startup experienced quite a few challenges during its development. To have better metric a startup should collect enough data from customers. In case of small data, the result of the analysis could be wrong, meaning the vision of startup could become false. Usually, it is not easy to convince a company to cooperate with an early stage startup, which does not have an even minimum product to show. From tens of collected companies around less than ten would respond positively and only few were ready to cooperate. In the end, the result was only few pilot customers because the rest were feared to work without POC. In addition, it is also crucial to controlling the amount of feedback as large amounts of data could slow down the process of development.

Overall this thesis has proven that applying lean startup methodology to software industry requires the tremendous amount of work both internally and externally. There will be always few challenges to overcome and a company should shift to more innovative thinking and culture to successfully scale up new businesses.

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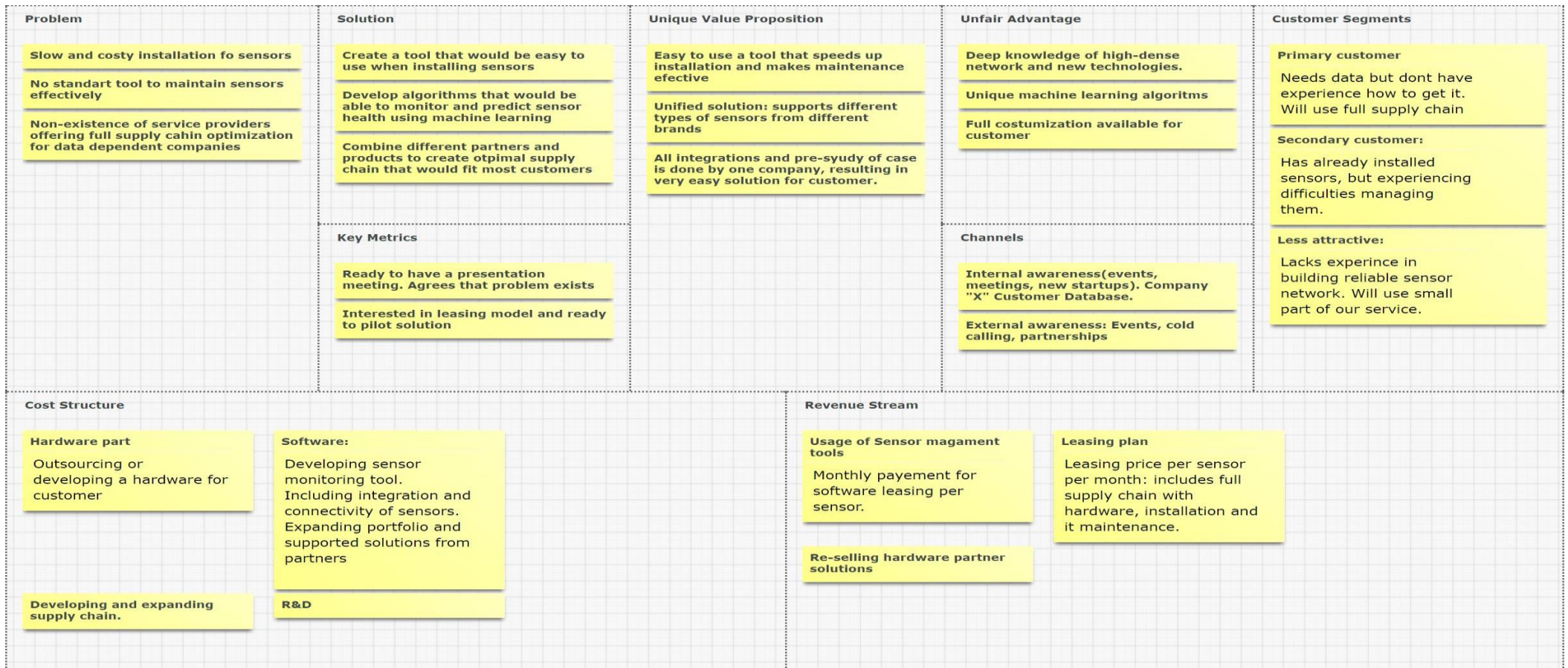
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Appendices

Appendix 1. Lean canvas



Appendix 2. . Front end (user experience) of the sensor management tool.

Install My Sensor Ltd. Home Projects Contact Logout (oops)

Hilton Hotel Tallinn
Floor 11

[Upload plan](#)

- AQ #323115
- PIR #382155
- AQ #323187
- AQ #323118
- PIR #382132
- AQ #323115
- PIR #382155
- AQ #323187
- AQ #323118
- PIR #382132
- AQ #323115
- PIR #382155
- AQ #323187
- AQ #323118
- PIR #382132
- AQ #323115
- PIR #382155
- AQ #323187
- AQ #323118
- PIR #382132

Timestamp: 1243338115
Package: T, H, S
Version: 1.0
Location: Unknown

ID: #323187
Timestamp: 1243338115
Package: T, H, S
Version: 1.0
Location: Unknown
[Remove sensor](#)