UNIVERSITY OF GOTHENBURG

Software as a Product Versus Software as a Service

Bachelor of Science Thesis Software Engineering and Management

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Abstract—Cloud computing is a model for enabling present, suitable, on - demand network access to a shared configurable computing resources [1]. Cloud computing is a new name for an old technology that has been spreading rapidly for the past few years. Moving from software-as-a-product (SaaP) to software-as-a-service (SaaS) can be considered a challenge for companies who don't have experience with such a migration. There are many aspects to be considered and much research to be conducted before making such decisions.

In this paper, we perform a case study on Atea Global Services, to investigate the difference between software as a service and software as a product. The conclusion of this research is based on interviews conducted on managers, developers, and consultants from different companies with different experience working with cloud. The research paper covers the nature of both technical and organizational aspects that are necessary to know prior to the migration.

1.   INTRODUCTION

Nowadays, the IT industry is filled with software products that are growing rapidly and they need to be supported with right services in order for them to sustain their productivity. In other words, organizations have to move to new models of IT delivery to guarantee their survival [2]. The number of companies who have tried to migrate from traditional applications to cloud based, is increasing every day, due to the virtualized computing resources and appealing business model that cloud provides. Recently, cloud computing is getting more attention in academic field as well as industrial field [3]. There has not been many studies focusing on both organizational and technical aspects of migrating to cloud from various perspectives within IT. The findings of this research is to provide qualitative data as well as statistics about the popularity and practical knowledge of cloud, in the domain of companies located in Sweden.

Atea global services, the case company for our research, is a leading Nordic and Baltic supplier of IT infrastructure. One of their branches is located in Gothenburg, Sweden, which develops software as a product and they are in the process of migrating their software to the Microsoft cloud, Azure. Atea Global Services have already chosen to migrate to Windows Azure cloud services. Windows Azure is a public cloud platform that provides the possibility to build, deploy, and manage solutions, and it provides the infrastructure resources [4].

The main goal of this paper is to explore the possibilities of having a software package distributed as a product versus as a service through a case study. The result of this paper will be beneficial for the case company, as well as organizations and individuals, who are interested in the bigger picture of both organizational and technical aspects of this migration. This paper will broaden their knowledge about the migration, by presenting interesting perspectives of the

migration and cloud, driven from managers, consultants, and developers.

Research questions :
1. When migrating from SaaP to SaaS, what are the considerable aspects and motivations from the perspective of IT-managers, consultants, and developers?
2. Between SaaP and SaaS, which method is more economical and secure for customers and the company itself?
3. What are the expectations and results after migrating to cloud?

Our research process was according to a qualitative approach. We followed a qualitative method for collecting data referred to as semi-structured interview. This type of interviews consist of open-ended questions and the chance for interviewers to further investigate certain themes [5]. In this research, data was analyzed by using the Qualitative Content Analysis method [6].

The outcome of the research is going elaborate on the research questions by projecting the interviewees' ideas into several charts as well as providing the readers of the paper explanations. The results are also going to supply them an easy comparison of data.

The rest of this research paper is organized as follows. Next section describes relevant papers to our research questions. Section 3, presents the methodology which includes the research process and the different methods for collecting and analyzing the data. In section 4, the findings are displayed. In the last two sections, discussion and conclusion of our research findings are shown.

2.   RELATED WORK

There has been many related work regarding the domain of our research, SaaS versus SaaP. One of the papers compared existing studies related to the migration of legacy software to cloud by performing a systematic literature review. The paper looked into the promised advantages of the migration. The outcome indicated the lack of tool support for improving the migration. They concluded that cloud computing is yet to mature further [7]. A study about the impact of migration from the previous environment to a new cloud, was looking at this migration from the business perspective which mainly involved cost efficiency and minimal risks. In this paper they introduced a set of tools called the Darwin framework, to achieve workload migration as well as discussion about migration to cloud. Their experiences in this field yielded valuable 170 insight into gaps that will need to be addressed and metrics that are beneficial for evaluating the performance [8].

Another research paper focused more on the technical issues associated with the migration of the traditional applications to clouds. They implemented a File Transfer

Protocol (FTP) service on Windows Azure and they concluded that clouds, Azure platform in specific, does assist developers with the process of migration from traditional applications in a fast and safe way [9]. However the data that has been presented in our research is not presenting a technical migration process in details, but it provides the reader a broader perspective of the migration from both technical and business perspectives. Security is an important aspect in the migration. A paper investigated the challenges in deployment and management services in cloud, from a security point of view, which led to the conclusion that customers would trust cloud computing only through trust-based integration into the security management tools [10].

A paper proposes a software modernization approach for moving legacy software to cloud. The approach covers both technical and business aspects. The Model-Driven Engineering (MDE) techniques are utilized to automate the reverse engineering of legacy software and forward engineering of cloud-based software, in such a way that modernized software profits from targeted cloud environments. In this research they developed tools, methods and techniques which allow them to migrate legacy software to cloud, and features of cloud environments are effectively used [11].

In summary, there is no case study to present the advantages and limitations of both technical and business aspects of cloud and migration, in the way we approach this case study.

3. METHOD

3.1. Research setting

3.1.1. Description of the case company
Our case company for this research is Atea Global Services. This company has many branches in Europe, the one we are studying on is located in Gothenburg and has approximately 300 employees. This company delivers IT products and services. Currently, most of the softwares are being sold through the company's web portal as products. In parallel the company migrated some of their softwares on the cloud, in order to host and sell them. The company is using Azure as a cloud. Azure is a Microsoft's cloud platform that brings the opportunity to deploy, build and manage your software on a worldwide network. At the moment, Microsoft's-managed datacenters which are supporting Azure are located in North America, South America, Asia, Europe and Japan. Currently Azure is available in 89 countries [12].

One of the main reasons for Our case company to migrate to cloud was, to have a better way to handle maintenance and keeping the software up-to-date, since it took them a considerable amount of time accomplishing that on-premise. This research will clarify a number of concerns for Atea Global Services regarding the migration to the cloud.

3.2. Research process
In this research we followed a qualitative approach [13] because we were investigating, the difference between two of the current available methods, thus this approach was the best way to reach, gather and present the data with.

We performed a case study on Atea Global Services. Case study is a qualitative research strategy that serves the purpose of our paper. Our data was collected from multiple sources, therefore the type of design for our research is Multiple Case Study [14].

We pursued one of the qualitative data collection methods, a semi-structured interview. Semi-structured interview is more of a conversational flow. In these type of interviews, new information may bring up new questions, and open-ended questions can be asked which makes the interview process more interactive [5], and that was precisely the case for us. Since our research strategy is a case study, the type of the interview questions was "How" and "Why".

Depending on the company's location and the interviewees' availability, the interviews were conducted, either in their working environment or Skype interviews. Multiple Case Study design assisted us in connecting, the gathered interview data with our research questions, and conclusions in a logical flow.

3.3. Sample selection
The technique in which we chose our sample is referred to as Judgment sample also known as purposeful sample [15]. We aimed for the most productive sample that answered our research questions. The size of our sample selection was 6 companies. The sample consisted four individuals involved in the migration process from our case company in addition to five individuals from five different companies. We asked for interviewing different positions in the case company who were qualified for our domain of research. As for other companies that we interviewed, we selected a sample of individuals that had, either experience working with a cloud or migrating from SaaP to SaaS. The details of the interviewees are demonstrated in the Table 1.

Table 1. Displays the participants who contributed in the interviews conducted for this research.

Role of participant	Company	Theme of the company
Solution architect	CGI	IT and Business consultancy
Executive consultant	IBM	IT
IT manager, Project manager	HiQ	IT and management consultancy firm
Product manager, Solution architect, Developer	Evry	IT
Co-founder, Software developer	Blicko Inc. AB	Music industry
Software developer	Atea Global Services	IT
Software developer, Consultant	Atea Global Services	IT
Solution manager	Atea Global Services	IT
Software developer	Atea Global Services	IT

3.4. Data collection

We performed pilot testing of the interview questions to verify that the domain of the interview questions addresses the needed information. We had 13 interview questions and for each question we had different themes depending on the data we gathered. For some questions we had one theme and for some other we had multiple themes, due to the different opinions provided by the participants. The number of conducted interviews varied from four interviews to one or two per week. The duration of each interview differed from 36 to 45 minutes. We designed our interview questions in a way that the data gathered from few interview questions, answered each research question. Most of our collected data were qualitative, however, we have also got quantitative data [5].

3.5. Data analysis

The method we used to analyze our date was qualitative content analysis [5]. Qualitative content analysis keeps the benefits of quantitative content analysis while applying a qualitative text interpretation. We followed this method because all the data is analyzed strictly step by step. Data was systematically dealt with and that is what differs content analysis from interpretive processing of data [16]. The procedure of our analysis started from identifying the domain of the interview. Then we begun summarizing the interviews by interpreting the context of the data as well as highlighting the keywords. The next step was structuring the data into categories. We assigned all the answers we gathered for each question. The identity of the data was kept during the process. Then we collected some interview questions that the

combination of their answers was the data needed for a specific research question. In the next step, we analyzed the data. The final step was summarizing the answers.

4. RESULT

4.1. Participants' background

The results from the interviews are presented in the order of the interview questions. Our first interview question was designed to identify the name of clouds that participants used or had experience with.
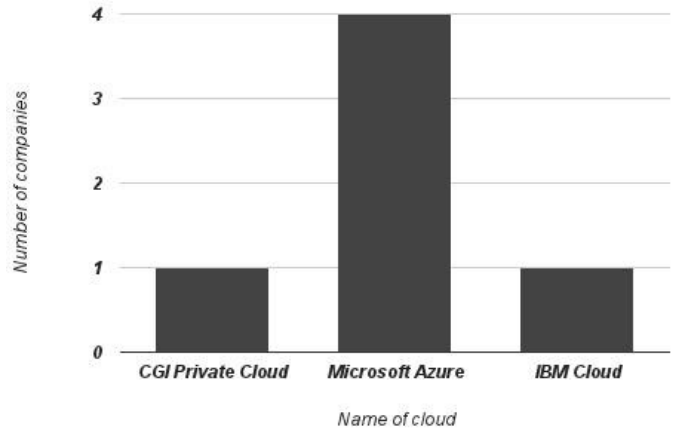

Figure 1. Used Cloud

Six of the participants did not compare different clouds prior to the migration. Most of the interviewees worked only with one cloud. However two of the participants, one of which is from our case company, did investigate about different clouds. A developer from the case company believed that Amazon is mostly focusing on infrastructure as a service type of cloud.
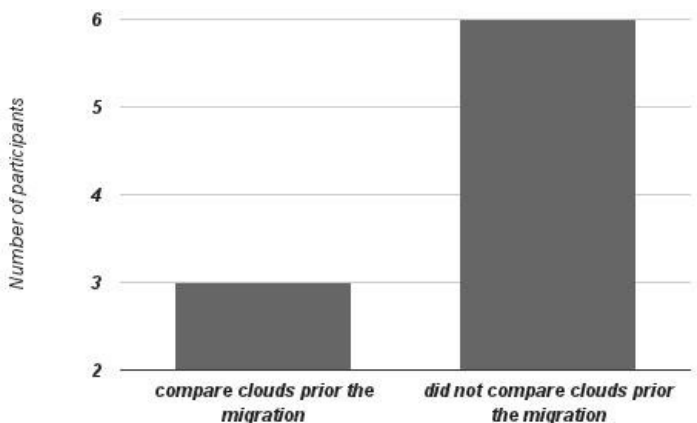

Figure 2. Cloud comparison

According to the developer, who has experience working with Heroku, Amazon, and Azure, the biggest difference among these clouds is that Azure has many surrounding services that makes it easier for development compared to others.

However, the other participant stated, Amazon has a better cloud base platform although the difference between Azure and Amazon is not significant.

4.2. Aspects of the migration

The participants were asked to explain the migration process in phases and there were some mutual steps among all the participants within different positions. However, they had differences. Managers and consultants considered cost efficiency. They also thought about placing the suitable people for the positions. While developers did not think about those aspects of the migration. Instead, developers concentrated mostly on how to create a basic set up of the software according to the customers' needs, improve their project while migrating.

We also asked the participants about the time it took them for the migration process for both planning and implementation and we chose to state the maximum and the minimum time it took them. Most of them stated that it depends on how much time they were given to implement this migration. The result that we have obtained, differs but the maximum period of the migration process took a company a year which consists of both planning and implementation. The minimum period of the migration process was three weeks for another company. The company who migrated within three weeks did not have to research for a suitable cloud which saved them time. They were picked by Microsoft and thus, they did not have any other option. However, the company that accomplished the migration process within one year went through the same process for migration as well as searching for a cloud that fulfils their needs. Our case company migrated some softwares on the cloud, Azure, and they talked about the cloud for about three years. However, they planned the migration in one week. In addition, the evaluation phase took them two to three weeks. Till now, the implementation phase took them six to eight weeks. They have done five iteration so far and each iteration took them two weeks.

For the next question, we asked the participants to evaluate the aspects that need the most attention when migrating from software-as-a-product to software-as-a-service. We applied $100 method, where the participant was assumed to have $100, and they had to distribute it according to the attention these aspects need. The results are displayed in Figure 3.
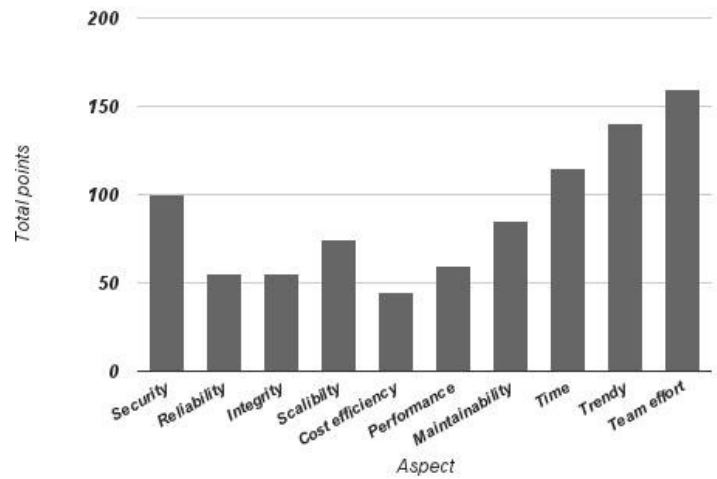

Figure 3. Migration aspects

4.3. Motivations for the migration

Each company stated technical and organizational motivations for migrating to cloud which are stated below, and shown in Figure 4 and 5. Horizontal axis label introduces the number of participants who thought about the same technical or organizational motivations, in Figure 4 and 5.

One of the companies did not have a motivation for migrating due to the fact that they were picked by Microsoft to migrate another well known company's product to Azure which was for marketing purposes.

- **Technical 1** stands for accessing files anytime of the day.
- **Technical 2** stands for accessing files from anywhere in the world. (Someone can have offices all over the world and still share the same technology in a very simple, secure way.)
- **Technical 3** stands for having an easy and secure way of doing service bus to accomplish task on-premise.
- **Technical 4** stands for scalability.
- **Technical 5** stands for keeping software updated.
- **Technical 6** stands for not needing the technical skills for installing and maintaining software.
- **Technical 7** stands for getting the environment and the service, up and running very fast(Speed).
- **Technical 8** stands for the convenience of using either Microsoft languages or any languages and development platform supported by Microsoft.
- **Technical 9** stands for the developers that had experience with azure.
- **Technical 10** stands for the possibility of having an Active Directory Federation Services (ADFS) or authentication.

- **Organizational 1** stands for trendy.

- **Organizational 2** stands for cost.
- **Organizational 3** stands for sponsorship.
- **Organizational 4** stands for the importance of not being the first adopter of a new technology.
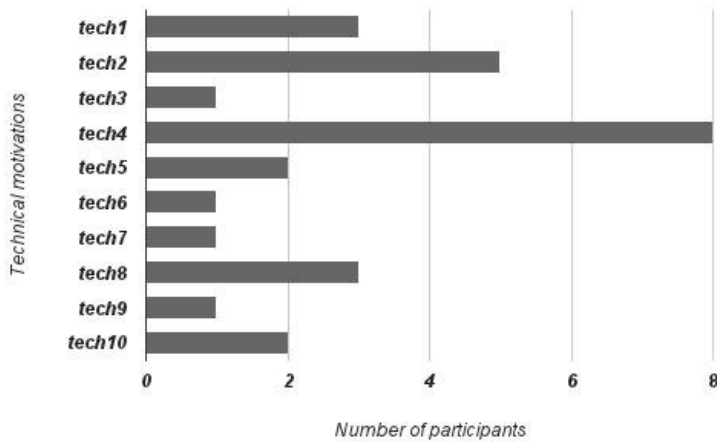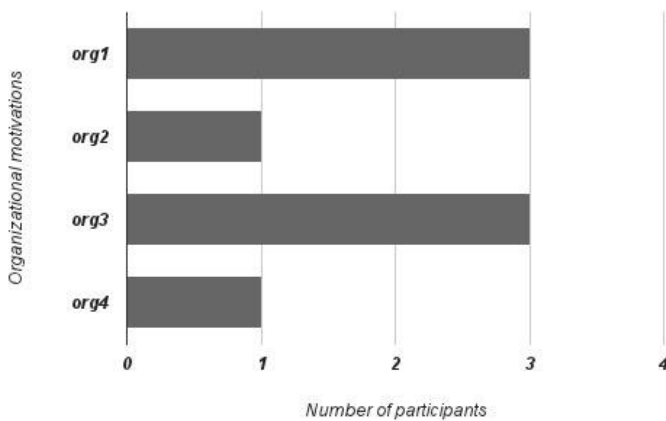

Figure 4. Technical motivations

Figure 5. Organizational motivations

4.4. Security

Most of the participants agreed that the security aspect of SaaS and SaaP depends on certain circumstances. The reasons they gave to back up their ideas regarding the aspect of security are stated below.

Reasons provided for SaaP being more secure than SaaS:
- If someone is not using their own cloud platform, then SaaP is more secure. Because the data is going to be stored in the countries that the cloud was provided. Countries have different laws and regulations, NSA privacy issues is an example of not completely trusting companies that are located in such countries. Even if the data is stored in Sweden, the backup process already puts it on a different continent. Thus they do not have full control of the data security.
- Incase of facing malicious viruses, etc, the data is more protected.
- Cloud takes care of security but someone might lose control over the security.
- If a company goes bankrupt. All the purchase orders, cannot be accessed by the company anymore, that is one of the biggest problem with SaaS.

Reasons provided for SaaS being more secure than SaaP:
- The data will never be mixed in SaaS. And the security for Azure datacenters are very high.
- SaaS for small companies is more secure, because Microsoft, Amazon, etc are better at maintaining security and firewall than most of small companies.

Reasons provided for SaaS being as secure as SaaP:
- When the data is transported over the internet with a secure FTP with SSL.

4.5. Cloud popularity

We asked the participants whether their customers like working with cloud or the traditional way of selling their products. This question was not applicable for one of the interviewees because his customers were not using the cloud rather the company itself. Two companies stated that the majority did not like the cloud and three other companies stated that the majority liked the cloud. Below the reasons behind their statements are presented.

Some of the companies who sell their products on cloud do not mention that they are a cloud service, which is interesting. One of the interviewed consultants, believed, approximately 40% of the Nordic Market has accepted that cloud is capable of serving them in the best way. Some customers are bound by some regulations and thus they are not allowed to move some information on cloud, but our case company believed in one year the customers will change their opinion. One of the reasons why companies are not open to use cloud, is because the customers can not be sure about the final cost of the product. The cost depends on how the customers use it, which is the reason why companies are unable to give a precise cost of the product.

Most of the participants emphasized on the aspect of scalability. They believed scalability can be built on other platforms incase of using Virtual Machine solutions. But when it comes to cloud solution, they believed scalability is easier to achieve. Company A has two types of customers, the customers who are providing the service, and the customers who are using the service. The first type is pleased with the cloud, that company A made, and this is how company A measures their own success. The second type does not tell the difference.

According to one of the managers, as long as a cloud keeps on updating security, providing new patches, and new features to its customers, then the customers will not start to consider other options available in the market.

An interview question was about whether the participants are satisfy with Cloud. the findings showed that Over all, the participants in this interview were satisfied with Cloud.

4.6. Cost efficiency

One of the interview questions addresses the issue of cost efficiency and whether it is more economical for the customers to buy products or for them to buy services. The majority of interviewees believed that the cost depends on, the service the customers want to buy, the way the service is purchased, what their expectations are, what they need and the type of cloud.

A consultant in company B thought, it may be more expensive but it depends on how you value the service. On the other hand, company A, believed that SaaS is more economical in long term. It costs more to put this in production, but if it is up and running, it usually reduces the cost. The cost reduction is due to not requiring the experts on-site at all times, which is going to appear In five to ten years. Cloud services are shared services thus, there is no need for customers to finance everything by themselves. But if there is only one customer then it is going to be expensive. Company C almost agreed with company A on the matter that SaaS is more economical for companies than SaaP.

Company D and company E agreed on SaaS having an appealing payment model. They believed cloud brings the possibility to get started cheaper and easier than having a product. For instance, it is possible to start a greenfield project without having to buy expensive servers and buy more services whenever there is a need for them. The greenfield projects do not contain any existing code from prior work. When having a data intensive project, SaaP is more economical. For example, a green field car company in China, have numerous users and their system is data intensive. In this case, having a traditional environment where there is no need to pay for the amount of data that is transferred, is cheaper for them than having their software as a service.

Company E and company D disagreed on the cost matter for end-consumers. Company E thought that for end-consumers, SaaS solutions are generally more expensive over time. However, the advantage is that you can try a full featured product directly, and only pay small amounts of money. On the other hand, company D believed that there are several factors playing role on this matter, and they were unable to state which method is cheaper.

Our case company believed, SaaS is cheaper for the company unless they had made huge investment in their infrastructure. Then it is more beneficial for them to install and run the software on their own network. Although for the end-consumers they were not certain. They thought when it matures in five years, it will become cheaper for both, end-consumers and companies which also depends on the software and marketing.

4.7. Critical business

We asked the participants if they is a possibility of losing their business, when migrating to cloud based platform. Company A did not lose any customers however they gained, after migrating to SaaS. Company E started their business with SaaS, therefore, they did not have experience on this matter. Company C and company B were under the same circumstances where they get their customer's consent prior to the migration process, therefore, they avoid losing their clients. In addition company C mentioned that political issues can affect someone's business in SaaS. For instance, if a company puts their data on-premise, which is the case of SaaP, they avoid problems that happen in other countries. Current customers of company D are affected by the migration. They are paying monthly fee, but if they migrate to cloud, they would have to change the payment model to monthly payment, in addition of paying for the usage.

Our case company is making iterative processes and migrating slowly. In parallel they are keeping their product on a web portal, which they are currently selling and are financially relying on. They are not putting everything at risk and moving everything on cloud. The customers who are buying the products on the web portal, either have their own infrastructure, or are bound by regulations that they cannot use cloud solutions. This is how they are lowering the chance of putting the company in jeopardy.

A developer from our case company, mentioned that they will win small companies as customers, when they have their products as SaaP. However, by having their products on cloud, they will lose such customers, because they are unable to afford the services anymore. He also thought some large companies feel comfortable being in their own network, rather than having their data on cloud. He believed if they were too focused on SaaS while migrating, and stop developing products in parallel, then they will not be able to financially develop SaaS. However with a good plan they can even gain more customers.

A consultant from our case company, had a different perspective. He thought that by migrating from SaaP to SaaS, there is a possibility that they lose their customers. He stated that it is not just putting the product on cloud, rather than putting what the product does on cloud. The product needs to be translated into a service, which is a risk of losing the customers. The investment of time and money to make it work and get feedback, is required to avoid the risk.

4.8. Expectations

The participants were asked to explain their expectations from cloud, and eventually state the result after the migration.
The expectations of company A were to obtain larger customer base, and not to be limited by technology or time. Cloud was a new idea that started as a proof of concept. The company predicted a need of it, in the near future by the market. In addition, they could not depend on the available

clouds in the market due to security reasons. So they developed their own cloud. They expected a better delivery which was the result after the migration.

Company B was expecting not to care about the infrastructure and to gain more flexibility after the migration. The result was as they expected. Company C was seeking for scalability and a better performance which was as they expected.

The aspects that company E could think of if they were to migrate, would be, cost-effective, scalable as well as having reliable platforms to build their services on. They also mentioned an easy integration with .NET and other Microsoft products. They thought it would be easy to build their softwares locally but seamlessly, being able to run them on the cloud for large-scale hosting.

Company D migrated from a traditional hosting server (physical or virtual) to cloud environment. They thought that the concept of a "file system" was no longer applicable. That was the single most challenging technical issue that they faced from day one. But on the other hand, they expected that scaling their application would not be an issue, which was the result. They also predicted that load balancing functionality would not be an issue with cloud and it was in place from day one.

A developer from our case company, expected to gain more customers and scalability. He also expected continuous delivery, since the build templates that comes with Microsoft, are not easy to make them work, the development operations have to be done by developers, and the case company do not have that much resources to put on continuous delivery. As the results, the table storage and deployment in Azure services were not as smooth as it was expected. In order to have the table storage as they want it to be, at the moment they are in the process of building a repository for data communication. Service Bus in Azure was one of the services that went well as he expected.

A consultant from our case company who is also a developer mentioned that he expected this migration to bring them multiple servers, and low delivery cost, since they do not have to set up their internal server. Furthermore they wanted to be able to have the servers up and running in a shorter time in comparison to SaaP. According to this member of the team, migrating and running an ADFS server on the cloud is not easy. Some functionalities are not mature enough to be done in full scale clouds in big companies, however they can be done in small companies. An example of the features that went well, was moving the licensing. He also expected to have a better load balanced functionality on the cloud which was as he expected.

Another developer form the case company anticipated SaaS to have the process of updating customers easier than SaaP. He thought SaaS is a more advanced solution, since they have all customers in one platform. But at the same time SaaS needs more responsibility to make sure that it works, and if it fails, it will fail for all customers at once. The developer stated that, until now the results were approximately as what he expected them to be.

The solution manager of the case company expected to gain more customers in different sizes and greater variety. He also expected more customers to try SaaS, than they have tried it so far. He anticipated easier support and responsiveness when detecting a bug. Also seeing more user statistics and user analysis of how the users are behaving, what kind of services are being used, and what are not being used so they know the aspects to focus on. He stated that until now they got positive feedback from their customers who are using the product on the cloud. Since our case company was not completely done with migration process, naturally, there will be more results later on.

5. DISCUSSION

The Migration of software from product to cloud is a crucial process that needs attention in different aspects. The first four interview questions are designed to provide a background of the interviewees' cloud experience for this research. Those were required information in order to communicate the research questions.

5.1. Research question 1

The combination of the following data, addresses our first research question. The most used clouds among our participants was Microsoft Azure that four out of six companies used. The other two were IBM cloud and CGI private cloud. Six participants out of nine did not compare other clouds prior to the migration. When it comes to the migration process, managers and consultants considered cost efficiency, placing the suitable people for the right positions, however, developers thought about how to create a basic set up of the software according to the customers' needs, and improve their project while migrating. The maximum and minimum time that it took participants to migrate was one year and three weeks. The most important aspects of the migration from different perspectives among our participants were, team effort which was the most important one, trendy which was the second most important aspect, time, and security were also crucial. Ten technical motivations stated for the migration as well as four organizational motivations which are shown in Figure 4 and 5. Some of the most mentioned motivations were as follows:
- Technical: scalability, and accessing files from anywhere in the world.
- Organizational: sponsorship, and having trendy way of selling software.

5.2. Research question 2

The second research question is for the purpose of knowing which method is more reliable when it comes to security and cost efficiency while migrating. Most of the participants agreed that the security aspect of SaaS and SaaP depends on certain circumstances. These circumstances

include the location of the stored data, malicious viruses, if a company goes bankrupt, and cloud taking care of security which might cause losing control over security. Others include the size of the company. However, there are always risks in both methods. These are some of them:

- All the cloud providers can hack into their own cloud and access the private data.
- When having SaaS, countries that the datacenters are located in, can be exposed to natural disaster or the tumults of war and the data will be destroyed.
- Incase of incidents in the country where SaaP is located, then there is no back up somewhere else.

We also asked about participants' perspectives regarding which method is more economical for end-customers. The majority of interviewees believed that the cost depends on the service the customers want to buy, the way the service is purchased, what their expectations are, what they need and the type of cloud it is. Three companies believed that having SaaS for customers in the long term is cheaper. Two companies could not state their opinions about how economical SaaS can be for customers. The last company believed that for end-customers, SaaS is more expensive than SaaP. As for how economically SaaS is for companies, five companies agreed on SaaS being cheaper for companies than SaaP under two circumstances. The first one is having data intensive project, and the second one is incase of having a huge investment in their infrastructure. Figure 6 and 7 display the results.
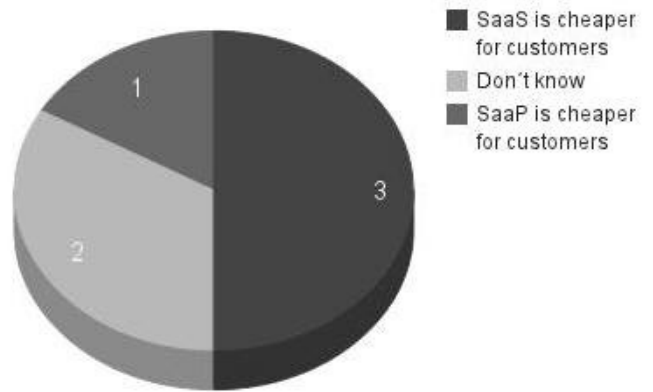

Figure 7. Cost efficiency for customers

Another interview question that was designed to answer the second research question was whether the migration is going to compromise companies critical business. One company was unable to express their thoughts for this question due to the fact that they never migrated but started as service. Two companies were in the process of migration, therefore they could not speak from their experience but they believed that they will gain more customers. Two companies got customers agreement consent prior to the migration thus avoiding any uncertainties. One of them also stated the reason that political issues can affect their business. One company migrated successfully and gained more customers after the migration. The results are displayed in Figure 8.
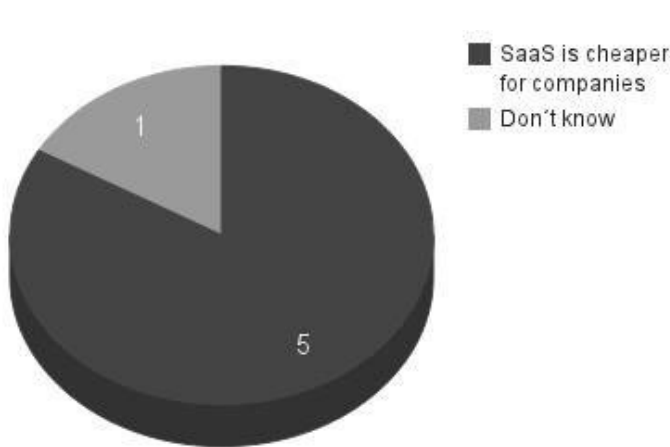

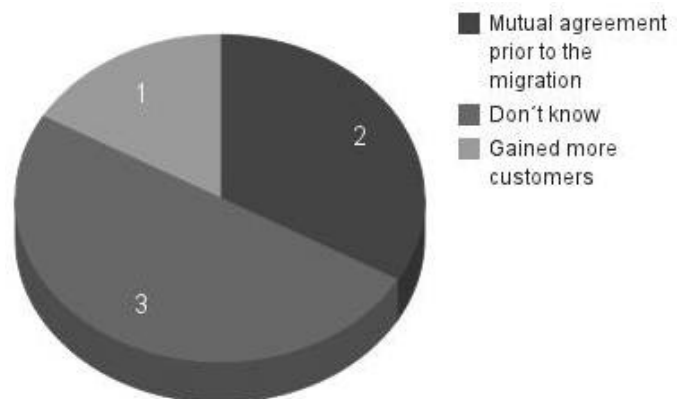**Figure 6. Cost efficiency for companies (providers)**

Figure 8. Migration effect on business

5.3. Research question 3

Our third research question was answered by four interview questions. The first question was comparing the popularity of SaaS with SaaP among customers of participants. The final answers are shown in Figure 9.
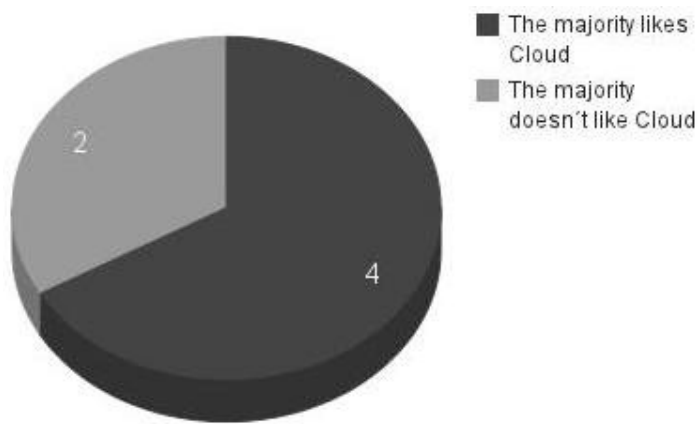
Figure 9. Popularity of Cloud among customers

Whether people are ready to accept cloud or they need more time to adapt such technology, is the question that many companies take into account, when they consider the migration. Most of the companies' interviewees agreed on the fact that cloud is going to be more popular in the near future. They further support the opinion by explaining that the word, cloud itself is not representing a good impression. Customers like it better, when they see the performance of the software.

There are several reasons why companies consider moving to cloud. We tried to gather the reasons, by knowing the expectations from cloud and collecting the final results after the migration. We saw the importance of focusing on their expectations as it is one of the important phases of the migration process. One of the companies started with SaaS, so they stated their expectations which were fulfilled in cloud. We asked our case company for their expectations in order to conclude, if all the members of the migration project have the same level of understanding, which was the case. They mentioned interesting expectations that complemented each other's point of view. Communication of individuals in the team can be a crucial factor for having a successful migration. After collecting and analyzing all the findings of this question, we have found many similar expectations and result, which are displayed in Appendix B. All in all, all of our participants were satisfied with cloud.

5.4. *Validity Threats [17]*

The possible limitations we had during our research topic include, the methodological limitations as well as limitations of the Researchers. They address the constraints that we were possibly subjected to, and how we validated them. These were the methodological limitations:

- Sample size

Sample size is the number of the resources we used in this research. The number of interviews is not significant, therefore there was a possibility to present wrong statistics. However our result is not only depending on statistics but also on the qualitative aspect. In addition, the people who were targeted for the interviews are not coming from the same positions and experience in a company. Because we wanted to ensure having a thorough perspectives of people in this field, and not just project a perspective of certain position in organizations.

- Lack of prior research studies on the topic

Citing prior research studies builds the base of our research. There was a possibility of finding few related research studies or none to our research topic, however, we used two reliable search engines to make sure we cover most of the papers within our research domain. The two search engines were Engineering Village and IEEExplore.

- Measure used to collect the data

The method in which is used to gather data, can reflect strongly on the final research results, thus, we chose semi-structured interviews. In addition we recorded the interviews to avoid misunderstandings and unclarities.

- Self-reported data

It is a complex process to take in what individuals express in interviews, as it is without being biased. When we transcribed the interviews, we tried to keep the originality of what they precisely said, regardless of who it is and which company the individual belongs to.

Possible Limitations of the Researcher :

- Access

Having access to the targeted people in organizations was a challenge, since most of them did not have time for an interview. We have contacted fifty one companies that the domain of their work was related to IT, and potentially our subject. Seven companies accepted being interviewed. Ten out of fifty one companies stated that either, they did not have time for interviews, or they believed the security of their company would be in jeopardy by the information the interview will expose. Even though the questions were not designed to expose any sensitive information, and we stated that the identity of the companies can be hidden.

- Longitudinal effects

The period of time in which the research topic needs to be explored can be challenging, when it comes to deadlines, for instance. We created a thorough plan at an early stage of the research that stated all the deadlines and milestones we had. When a task was not done according to the deadline, we adjusted the plan accordingly.

- Fluency in a language

Since the interviews were conducted on Swedish companies in English language. There was a possibility that interviewees could not express themselves. To ensure that they understood what the questions' goals were, we tried to clarify the ambiguity during the interviews. In addition we had few questions that they all were seeking for one goal. The reason behind that was to validate that the interviewees were stating the ideas that are not contracting each others.

- Validity by case company

The case company has read our research paper and it has been approved by them.

6. CONCLUSION

This paper set out to answer research questions, in the purpose of providing our case company with data that is useful for their migration from software-as-a-product to software-as-a-service. The effective aspects of this migration process were demonstrated through several figures as well as the analysis of the data extracted from interviews. We had three major research questions that were answered through thirteen interview questions. The interview questions were asked from six different companies, including our case company.

Our first research question was investigating the technical and the organizational motivations that made companies migrate to cloud. Different companies had mutual motivations even though they worked with different clouds. Four out of six companies were sponsored by Microsoft and thus used Microsoft Azure as a cloud. As for the other two, they created their own private cloud. Some of the participants believed that Azure and Amazon are similar, however by looking at their decisions we concluded that they chose Microsoft Azure based on the sponsorship. One of the important organizational motivations that most of the participants mentioned was to be trendy.

The second research question of this paper was to find out, how economical and secure SaaS and SaaP are for companies and customers. The results that we got were depending on various circumstances. Most of the participants were unable to provide solid answers for the security aspect. As for cloud being more cost efficient for companies (providers), majority of participant thought that SaaS is more economical in general. As to whether SaaS is more economical for customers than SaaP, three out of six participating companies, believed that to be the case.

Our final research question was addressing the participants' expectations from cloud and the outcomes after the migration. In addition, we wanted to find out whether the customers are satisfied with cloud. Four out of six participants believed that their customers are satisfied with cloud and the other two participants did not believe so.

To sum up, the data gathered for the last research question showed that most of participants' expectations were fulfilled by cloud, and all of our participants were satisfied with cloud. However, there were some minor expectations that are not as good as they expected them to be. In conclusion, when a company wants to migrate from SaaP to SaaS they need to take into consideration some aspects that are crucial for the migration process. These aspects are, cost efficiency, and security, as well as their motivations, their expectations and their needs.

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Interview questions

1	Which cloud did/do you work with? Do you have any previous experience working with a cloud? If yes, which cloud(s) you had experience with?
2	Prior to the migration, did you compare any other Clouds to the chosen Cloud ?
3	If you would have to explain the migration process in few phases, what would those phases be? (Please give examples of aspects that went smoothly and aspects that did not work out well.)
4	Rank these aspects which need to be considered in your opinion, when deciding to migrate from software-as-a-product to software-as-a-service? (Reliability, Security, Integrity, Scalability, Cost efficiency, Performance, Maintainability, Time(for the migration process), Choosing a trendy way to sell products, Team effort) (you have 100 $ to freely distribute on these aspects according to how much attention each aspect needs, when migrating to SAAS from SAAP, the more you give a certain aspect, the more you think it needs focus on)
5	Which organizational and technical motivations did your company have by using the cloud?
6	How much time did the planning and the implementation for the migration process take? If you are not sure can you give an estimation?
7	How secure and private your customers' personal information are and your company's information, when migrating to a cloud platform in your opinion? Which way is more secure? (traditional or cloud)
8	How do your customers like Cloud compared to traditional way of selling your product? (managers and consultants are the intended interviewees for this questions)
9	Is it more economical for the customers to buy products or for them to buy services? (managers and consultants are the intended interviewees for this questions)
10	When moving to a cloud platform, is it going to compromise the company's critical business? (losing customers, putting your company in jeopardy)
11	What are your expectation from migrating to the cloud solution ? (What changes do/did you expect?)
12	What were the results after the migration? (Was it as you expected them to be?)
13	How satisfied are you working with the cloud? (Satisfied, Somewhat Satisfied, Somewhat Dissatisfied, Dissatisfied)

Number of participants who had mutual expectations	Expectation	Result
3	Continuous delivery	Positive
4	Gaining more customers	Positive
1	Not to care about the infrastructure	Positive
2	Flexibility	Positive
5	Scalability	Positive
2	Having multiple servers	Positive
2	Performance	Positive
3	Cost efficiency	Positive
2	Reliable platforms	Positive
2	Easy integration with .net and other Microsoft products in Azure	Positive
2	Enabling one or as many instances of the application	Positive
3	Better load balancing functionality	Positive
2	Having multiple servers	Positive
2	Servers up and running in shorter time in comparison with SAAP	Positive
2	Moving the licensing	Positive
2	Updating process easier than SAAP	Positive
2	Easier support	Positive
2	Responsiveness when detecting a bug.	Positive
2	Possibility to see users' behavior so the aspects to focus on are clear.	Positive
1	Unsatisfied with table storage in Azure	Negetive
1	Unsatisfied with the deployment in Azure	Negetive
1	Unsatisfied with the concept of file system in Azure	Negetive
1	Running and ADFS server on Azure is not easy	Negetive
1	Some functionalities are not mature enough to be done in full scale clouds in big companies, however they can be done in small companies.	Negetive
1	More customers to try saas than they have tried it so far	Negetive
2	Cloud provides services that will support your product however, constant responsibility is needed for up time, availability and support	Negetive