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Cloud Computing

The Adoption of Cloud Computing for Small and Medium Enterprises

Bachelor's thesis within Informatics

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Abstract

The objective with this research was to investigate and understand the adoption of cloud computing and to find the process of adopting cloud services. The method used to collect data was interviews. To find both the users and the providers perspective two cases were investigated, one user case and one provider case. The results were divided into two parts, the first a number of categories that were found when comparing the user case to the provider case, the second a process that describes the adoption of cloud computing. The categories in the first part of the results are; decision process, definition of cloud computing, integration and security, adoption and future development. When analyzing the results we came to the conclusion that both users and providers are striving for simplicity, security and to move the responsibility away from the user. The adoption of cloud computing is not as complex as many organizations have thought and by moving the applications and hardware out of the organization the user can focus on its core strategies.

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I Introduction

The topic of our research is Cloud computing. Cloud computing has become an important tool for many organizations, it can help organizations outsource their IT apart from having in-house solutions.

The topic of cloud computing is interesting because it is an up and coming IT artefact in the IT world. Cloud computing has big potential and it has many perspectives that are not yet explored. Along with the undiscovered facts that exist there are some concerns that we know exist that also need to be researched to make cloud computing make a big impact in enterprises globally (Carr, 2008 p. 1).

The cloud technology acts like a service that a provider can apply to a user, and the user can hire storage, applications or other services through the cloud. The cloud which is a metaphor for the internet as the services is provided in the platform that is available for all. There are different types of cloud services as there are many different users. Private, public and hybrid cloud are the most common used services. The unique concept when thinking of cloud computing is that you can hire services like, hardware and only pay for the time you use the services or how much you store. It was suggested that cloud computing will follow the electricity pattern, meaning that companies only pay for the amount of electricity they need from one day to another. This means you actually pay-as-you-go because you only pay for the information, storage or application you need and how much you use it (Carr, 2008 p. 1).

One example of how cloud computing has grown is Amazon, Amazon web services was one of the first and biggest providers of these kind of services. They helped companies that did not have technology in house to grow and have success. By figures provided Amazon actually grew from using a dozen of machines when providing services to using up to 5000 machines in data warehouses (Smith, 2009). This is very exciting; if enterprises use clouds in the right way and know how it works it can reduce costs for those enterprises and give them good advantage.

In this research the focus will be on the adoption process for users choosing to implement cloud services. The research will focus on the providers perspective and also the users perspective to investigate cloud computing adoption thoroughly.

1.1 Background

Cloud computing derive from grid computing, a predecessor to the subject. The grid as it is called is a domain of connected computers in most cases. The connection makes computers work together to achieve a common goal. The relation to cloud computing is close because it has the same goal as cloud computing, using something that is not in your computer to do a specific work task. Grid computing is a very simple version of cloud computing where you use for example servers, processors, and other hardware that you need with no knowledge of where the hardware is coming from or where it is situated (Bart, Brown, Fukui, Trivendi 2005).

Cloud computing is a fairly new technology that has been growing fast the last few years. As IT has been introduced in many markets and the new way of doing business now involves some kind of IT, cloud computing has become a bigger variable for companies and organizations all over the world. Cloud computing is growing steady and many big corporation's like Microsoft, Apple and Amazon are investing a lot of money on cloud technology (Cloud security alliance, 2009 p. 15). Cloud computing includes (SaaS) Software-as-a-service and (PaaS) Platform-as-a-service as well as (IaaS) Infrastructure-as-a-service even though there are different opinions. The market grew after the dot com bubble with some companies started to invest in datacenters and further down the timeline also smartphones, mobile applications and utility devices connected to the cloud (Cloud security alliance, 2009 p. 15).

There are servers, software, hosting, storage and subscriptions that you can use through the cloud. The bigger corporations often have a well-developed strategy for their IT but some applications could work better if they are to be used via a provider out of house. Small and medium enterprises (SMEs) are using more services to support or even take care of their whole IT solution. In a survey done in May 2011 by the Zoomerang team (a research organization that conducts different kinds of research and investigations) it was said that "this research points to the need for cloud vendors to educate business owners on what cloud computing is and how it's relevant to SMEs" (Crossett, 2011). The study also shows that only 10% have deployed a cloud computing service in their work. The other are either not familiar with the technology or have heard about it but do not know what it means.

The fields that is most popular to invest in is email services, data storage and customer service. There is also a pattern of that the IT budgets are growing and with that the roles of the IT people like CIOs grow and they get naturally more responsibility (Crossett, 2011).

Although cloud computing still has issues like security, privacy, legal and sustainability it still has huge potential as there is a lot of room for improvement and also not many has transferred into the technology. According to (McKendrick, 2012) cloud computing will provide job opportunities, increase productivity and help the world economy. The leading companies are innovative and big, often with room for failure. The companies that do not yet have a cloud service need to know what to do and also know what it is to actually try to adopt cloud computing. The process is unfamiliar to them and that makes for not accepting the technology easy. The problem is that they do not know why or how they will use a service they do not yet fully understand.

There has been several recent studies in this field but most of them have been looking at the advantages and disadvantages such as cost and security. There is not any that seriously looks at the adoption process of cloud computing and the attitude of the decision makers (Grossman 2009).

As it is very different what companies need to take their business further there needs to exist information technology that add some kind of value to the business. Enterprises need to consider the advantages, drawbacks and processes to adopt cloud computing successfully. The global market does not fully trust cloud computing today. There are some variables that are taken into account when enterprises choose an IT strategy. The motivations for choosing a particular solution are many and different for many organizations. The goal will be to try, develop and understand the adoption processes involved in the cloud and the advantages that comes with it.

1.2 Problem description

We want to fill a knowledge gap that we believe exist in the field. Many enterprises do not know what cloud computing is or for what purpose someone can use it. When companies decide for not to implement cloud computing, it is because the lack of knowledge and information, the belief is that the in house technology is better and cheaper, “the easy way

out”. The problem is often that cloud computing do not get the proper chance in competition with a more traditional IT solution, because the lack of knowledge. That is why we want to try to look at the users and providers that exist and try to determine the adoption process of a cloud service along with the decision to adopt it. A general IT adoption process that can be used to gain advantage with cloud computing. Also help to better understand what cloud computing is and what makes cloud computing a very good and exciting topic for companies to think about. The study helps organizations that are thinking about cloud computing to better see the advantages and risks with adopting it.

Similar research has been done in the field, many are focused on the benefits and risks of cloud computing. There have also been studies about the adoption of IT. Hasan Nuseibeh (2011) made a similar research called “Adoption of cloud computing in organizations” where the problem is about offer consideration to organizations that are in the verge of adopting cloud computing lists of benefits and risks. This study do have a similar focus towards the adoption process, but more on the risks and benefits than the actual process of cloud computing adoption. The research gives a more general view of the problem as this research is set to focus on small and medium enterprises (Nuseibeh 2011).

1.3 Research Question

As we described previously, the focus will be on the theory of adopting cloud computing and what makes enterprises choose this option and how they come to the decision. The process that starts with thinking about cloud computing and actually adopting it as a service. We want to answer these questions with our research.

- **What are the main concerns when adopting cloud computing for SMEs?**
- **What is the process by which SMEs adopt cloud computing into their business?**

This research has two research questions because to be able to create a process we need to investigate the main concerns of the adoption of cloud computing. The concern that are considered when making a decision towards cloud computing.

1.4 Purpose

The purpose with this thesis is to answer the research questions and give the tutors and readers a better understanding of the IT adoption and implications of cloud computing as well as the process of adopting to cloud computing. We intend to fill a knowledge gap in the field of cloud computing. The knowledge gap of the adoption process and the decisions that forms an implementation into a cloud service. We intend with the research to confirm what we know and has read about cloud computing and also see what we do not know can have an impact on how organizations see cloud computing. This will give a better understanding for the reader of what cloud computing is and how the future looks. The aim is to describe the theoretical point of view in the matter and not focus on the technical aspect as much as the theory behind it. This paper should be able to work as a tool for organization that is hesitant on what cloud computing is and how the process looks.

1.5 Delimitations

As stated before the focus of the thesis will be from both provider and user. The technical part of cloud computing is not something we will focus on mainly because we do not see any interest in that for this research, our focus is more in the theory of use. How the users and providers see and feel about the service of cloud computing. Also the legal security issues that are related to cloud computing is not anything that will be covered in depth. We may touch upon some areas but not go in them in depth as we want to put our effort in the investigating of our research questions mainly.

2 Theoretical framework

In this section definitions will be stated on the term cloud computing and also explain the different characteristics, deployments and services. Some selected definitions of cloud computing will be evaluated and connected to our research. The information in this section will be a foundation for our data collection and later our analysis.

2.1 Cloud computing

The predecessor to cloud computing is grid computing, very similar in many ways. Grid computing are many computers combined to solve a common goal. The computers can be connected through different locations and by that forming a virtual computer that works to achieve a common goal (Bart et. al 2005). This is where the similarity to cloud computing comes in, as cloud computing focuses on services provided virtually in the “cloud”. The services could be many things like servers, news, information, storage and applications (Foster, Kesselmann 1999 ch2). Cloud computing refers to the services that can be provided over the internet, often called Software-as-a-service (SaaS) and the hardware and system that support the services that exist. The hardware and systems that is located in datacenters in many cases is what we refer to as the “cloud” (Armbrust, Fox, Griffith, Joseph, Katz, Konwinski, Lee, Patterson, Rabkin, Stoica, and Zahaira 2009 p. 4-5).

2.1.1 Definitions

2.1.1.1 Cloud Computing

In a survey done by Rackspace (2009), a cloud service provider, it was said that 60% of the persons that were asked did not know what cloud computing was and nearly 40% think that it is servers on the internet, applications or storage. The definitions are many and it could be hard to define a good one that summarizes the concept as researchers have different views on what cloud computing really is. Many think that cloud computing can only be if the cost is scalable as well as the service provided while others think the cloud could include services that are provided for a steady price, as long as the application or hardware is maintained in the cloud in for example datacenters(Armbrust et. Al. 2009 p. 4-5) The Swedish IT-architecture union (IASA) did work on a general definition over a long time under 2008 as seen in Table 1 (Akenine, 2009 p. 8). We have collected some other definitions

along one done by IASA to form our own definition that fit to our research and how we see cloud computing.

Definition	Authors	Focus and relation to our topic
<p>The term cloud computing relates to both applications that deliver services over the web also to the hardware and system software that provides these services. The application services are considered software as a service, The hardware and system software is what we define as the cloud. Cloud computing is characterized by two important characteristics; experience unlimited resources and pay per use. The service that is offered by the cloud is called utility computing, it can be closest related to resource usage of electricity or water. When a cloud is available to the public, it is called a public cloud. A cloud that is not made available to the public is called a private cloud. A cloud that cannot offer unlimited supply and pay per use is not offering cloud computing. Cloud computing can therefore include both utility computing and software as a service</p>	<p>IASA, 2009</p>	<p>Focus is on the details of cloud computing and all aspects that defines cloud computing.</p> <p>A good description for us because we investigate the adoption, with an adoption there needs to be good information to choose a service.</p>
<p>Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.</p>	<p>NIST, 2009</p>	<p>Describes the details of cloud computing, a more general description.</p>

Using the internet to allow people to access technology-enabled services.	P. Gaw, 2008	Very intermediate description of cloud computing.
a broad array of web-based services aimed at allowing users to obtain a wide range of functional capabilities on a 'pay-as-you-go' basis that previously required tremendous hardware/software investments and professional skills to acquire. Cloud computing is the realization of the earlier ideals of utility computing without the technical complexities or complicated deployment worries...	J. Kaplan, 2008	Focusing on the business aspect with investments and cost. Good example for us in terms of definitions.
The key concept behind the Cloud is Web application... a more developed and reliable Cloud. Many find it's now cheaper to migrate to the Web Cloud than invest in their own server farm ... it is a desktop for people without a computer	R. Bragg, 2008	Explains the mobility of clouds.
A style of computing where scalable and elastic IT enabled capabilities are delivered as-a-service to external customers using internet technologies.	Gartner, 2009	Slightly different opinion on cloud computing than our view.

Table 1 Definitions table (Vaquero, Rodero-Merino, Caceres, Lindner 2009 p52)

With the knowledge we got from the authors above (see Table 1) we have developed a definition that describes cloud computing from our understanding and what we think helps to follow our thesis.

For this thesis we define cloud computing as:

“Cloud computing refers to Applications, hardware and software obtained and distributed to different platforms through the internet. The distribution should be geographically independent, and the service should be scalable, on demand and mobile. Work tasks should be available to carry out everywhere there is an internet connection.”

2.1.1.2 Cloud Computing providers

A cloud computing provider is a company that provides the required technology to enable a cloud computing service. The company host and provide the infrastructure required to be able to offer the cloud service. The vendor can also use a hosting provider but the important aspect is that the user doesn't have any hardware locally (Dargha, 2009 p. 2).

2.1.1.3 Cloud Computing Users

The user of a cloud service is an enterprise or an individual who uses the cloud service provided by the cloud computing provider. The user doesn't have any hardware or infrastructure in-house but use the provided service from the provider by a connection to the internet (Dargha, 2009 p. 2).

Some cloud services require an application to be installed at the user's environment but there are some who believes that this cannot be categorized as cloud computing.

2.1.2 Drawbacks and advantages of cloud computing

The drawbacks and advantages listed here are general and the most common among the issues or benefits.

Drawbacks

- Security and privacy
The drawback that comes into mind first when talking about cloud computing. A user can only trust and hope that the provider have a good policy towards security and privacy. Many companies hesitate because data is handled by an external source (Paul 2010 p. 1).
- Control
As the first issue addresses the involvement of an external source takes away the control from the user. Many CIOs like to have control over their data; naturally the lack of control is an issue for not choosing the service (Paul 2010 p. 1).

- Cannot deal with huge data sets
Meaning that it is still hard to move big amounts of data through the clouds. It is not fast and may cause trouble when wanting to move for example several terabytes (Paul 2010 p. 1).
- Connectivity
The cloud is reliable on the web and there have to be an internet connection for the cloud service to work (Paul 2010 p. 1).
- Reliability
The provider may not have good reliability and there is a chance for performance issues when something goes wrong. It is something that needs to be considered (Paul 2010 p. 1).
- Cost
The technology is fairly new and therefore can be expensive to implement at first. But the cost is often decreased over time (Paul 2010 p. 1).

Advantages

- Reduced cost
As cloud computing is paid per use of the service or the length it is easier to keep cost reduced and under control (Cloud news desk 2008 p. 1).
- Storage space
There is the possibility to have more storage space than on the computers because of the storage provided through the cloud (Cloud news desk 2008 p. 1).
- Automated
The IT is always up to date and with the latest release, also it is managed by the provider so the IT department can focus on other tasks (Cloud news desk 2008 p. 1).

- More mobility
The employees and other people connected can gain access to data wherever they are and with many different sources like tablets, smartphones and laptops (Cloud news desk 2008 p. 1).
- Flexibility
The cloud makes the IT flexible and obtainable through different sources and also makes it easier to work with (Cloud news desk 2008 p. 1).

2.1.3 Cloud computing model

There are many definitions on the term cloud computing, but to understand the definition from IASA and what it really describes we should go through the subject of cloud computing and how it works. Also what different services that can be used within the area of cloud computing.

Cloud computing is the delivery of a service rather than a product. The service is an application, storage space, social networks or server hire. The service is totally managed in the cloud, usually the internet, intranet or extranet and accessible through computers as well as devices (smartphones, tablets, laptops). The services are provided through data centers all over the world, all that is required is of course an internet connection. The resources obtained from the cloud can be used and released with small means of management and involvement by the provider. In some cases it is possible to start using service just moments after ordering it. (Cloud security alliance, 2009 p. 14-15)

The cloud computing model made by the national institute of standards and technology (NIST) has a good well accepted model of cloud computing used by many when describing cloud computing (see Figure 1). It describes the characteristics, deployment models and the service models. The model defines the different parts of the concept cloud computing well and will be covered below (Mell & Grance 2009 p. 4-5).

Visual Model Of NIST Working Definition Of Cloud Computing
<http://www.csrc.nist.gov/groups/SNS/cloud-computing/index.html>

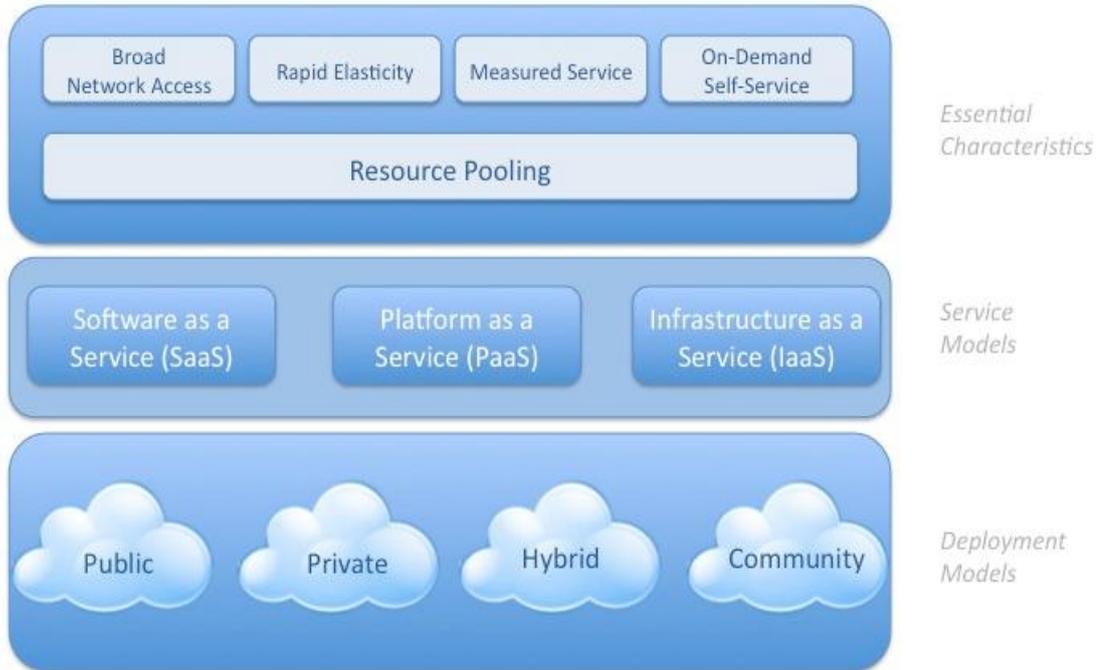


Figure 1 NIST Visual Model of Cloud Computing Definition (Mell & Grance 2009).

There are five main characteristics of the cloud computing:

- On-demand self-service
A consumer can without actually interacting with the provider change such things as server time and network storage directly from the net, by doing so have a clear picture of what is done (Mell & Grance, 2009 p. 4-5).
- Measured service
Cloud systems can control how much someone uses the service weather it is storage, server use, bandwidth and other usage. Resources that are used are being monitored and then reported so the user get an overview of the usage and pay accordingly (Mell & Grance, 2009 p. 4-5).

- **Broad network access**
The network access is broad in terms of that it can be used over a lot of platforms and devices, that enables easy communication between different nodes (e.g. smartphones, tablets, work-stations and laptops) (Mell & Grance, 2009 p. 4-5).
- **Rapid elasticity**
Capabilities can be provisioned and released elastically and automatically. The capabilities can be changed to fit the consumer demands and needs, and can be done at any time (Mell & Grance, 2009 p. 4-5).
- **Resource pooling**
The resources of the provider are pooled and situated at one location to provide services to multiple consumers through lots of virtual and physical resources that can be assigned and reassigned to fit the consumers. The customer has no connection to the location of the provider's resources but have some knowledge of where it is geographically. The resources of providers are storage, network, bandwidth and servers (Mell & Grance, 2009 p. 4-5).

2.1.4 Service models

There are three different service models that are used in cloud computing to describe the different services that can be obtained, Software as a service, Platform as a service and infrastructure as a service. They will all be presented more in detail here.

Software as a service

Software as a service (SaaS) is focused on renting out applications to users that use it over a subscribed time. The application is not owned by the user, it is owned by the provider that makes the user pay for the amount of time they want to be able using it. The user is not responsible for the maintenance of the application. Unlike the usual applications where you install directly on the physical computers and manage the applications totally by your own, the SaaS is a service that a company pays usually a monthly fee to obtain (Levinsson 2007 p. 1).

According to Mell & Grance (2009 p. 4-5) in NIST's cloud computing definition SaaS is the renting of both infrastructure and applications which are totally managed by the provider through a web client, for example a web based email. The entire infrastructure is situated in datacenters. The only configuration that can be done by users is the settings for the application the rent (Mell & Grance 2009 p. 1-3).

Platform as a service

Platform as a service (PaaS) is very similar to SaaS; it focuses on the rental of infrastructure so the user gets a platform to build their own applications with programming tools provided by the provider. The services include servers, operating systems or storage space and the help with building an application. The main difference between SaaS and PaaS is that SaaS gives you little space to build something of your own while PaaS gives room for maintaining the application on own terms. (Cloud security alliance 2009 p. 17)

This type of renting gives the user free handles to maintain their own applications. It is a good option if there is an application that needs a better platform to work properly but resources in an organization cannot support it. Then PaaS lets an organization to hire the necessary infrastructure to support the application to a full (Mitchell 2008 p. 2).

Infrastructure as a service

Infrastructure as a service (IaaS) takes it one step further than SaaS and PaaS. IaaS is when providers are handling only the infrastructure for a user and the user can run and develop software within the hired cloud infrastructure which is situated in a datacenter often. The user can run operating systems and applications on their own terms, maintain the storage and deploy the network they want by hosting firewalls (Mell & Grance 2009 p2-3).

IaaS have providers only maintaining the infrastructure and could also be referred to as hardware as a service (HaaS). The user often pays for each time they use the provider's hardware (Mitchell 2008 p. 2).

2.1.5 Deployment models

There are four different deployment models unrelated to what service model that is used there are deployment models that can be applied to all of them.

Private cloud

This type of cloud structure is to be used by only one organization and is managed by them also. The infrastructure could be handled by a third party or themselves depending on the service agreement that exist. The private cloud could be an intranet or email system that only users within the organizations can use and have access to (Mell & Grance 2009 p. 2-3).

Public cloud

The public cloud is available to the general public often for free and with a payable option. The service could be provided by many like: government, businesses and unions. A good example is the providers of free online storage (Dropbox) (Mell & Grance 2009 p. 2-3).

Community cloud

This type of cloud is used by communities that consist of many organization or other users. It may be owned by the community to serve the community or by a third party member that is external. The involvement of the provider is here again depending on the service model that is applicable. A very good option when forming partnerships (Mell & Grance 2009 p. 2-3).

Hybrid cloud

Hybrid cloud is a mixture of the explained deployment models (Private, public and community). They are bound together but still belonging to itself as a deployment model. An example could be that a public cloud exists within an organization for all employees and within this cloud is a private cloud only accessible for managers (Mell & Grance 2009 p. 2-3).

2.2 Adoption

Adoption means taking something new and making it your own. In terms of Cloud computing and for this research adoption is describing when not having cloud computing to making it part of a company's infrastructure.

2.2.1 IT Adoption

IT adoption can mean a lot of things, it is important to know what IT adoption means in terms of our paper and cloud computing. Technology adoption or IT adoption has many different views, a lot like cloud computing. It is mostly because there are a lot of different technologies and it is hard to determine a common general definition that includes many of the technologies. Most people affiliate technology as internet and computers while many others think about cameras or other devices in beforehand. On top of that fact users adopt technologies under different circumstances, especially in the mobile dominated world we live in nowadays. When someone takes out money from an ATM or does their banking services in the internet bank, it should be considered that technology are created by different people for different things. (Bridges to Technology corp 2005 p. 1). To define the adoption of IT we investigate a process of 5 steps (Bridges to technology Corp 2005):

- **Awareness**- potential users learn enough about the technology and its benefits to decide if they want to investigate it more.
- **Assessment**- potential users evaluates the usefulness and usability of the technology and the ease of adopting such a technology.
- **Acceptance**- potential users decide to get and use the technology, or decide to not adopt it at all.
- **Learning**- users develop the skills and knowledge required to use the technology in a good way and efficient.
- **Usage**- users demonstrate good and effective use of the technology.

The adoption can be defined lightly as a process which the users goes through, that starts with awareness and ends with appropriate use of the system. It should be said that users goes through these stages differently. Some can go through the stages in one "sweep" and others take time in between every stage. It depends much on what technology and to what purpose the IT is going to be used as well as the price (Bridges to technology Corp 2005 p. 1).

The theory is based on an earlier adaptation of the adoption model done by Bohlen, George and Beal from 1957.

2.3 Small and Medium Enterprises (SME)

For our thesis Small and Medium enterprises (SMEs) is the group assessed. SMEs is a well-known abbreviation in most of the world and is accepted by the most. SMBs (Small and medium businesses) is a common expression for the term in USA. SMEs refer to the small, medium and also the micro organizations that exist. To know what organizations that can be counted as an SME there are three criteria's that has to be evaluated. The staff head-count, balance sheet and the annual turnover of an organization takes into account when assessing whether it is an SME or not (EU-Commission 2003 p. 22).

SMEs provide a big part of the global economy, in Europe SMEs represent 99 % of all enterprises. Therefore there are many jobs within the area. The definition of SMEs and what represents it is well described in the European Commission guide to SMEs(EU-Commission p. 35).

- The category of micro, small and medium enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and an annual balance sheet total not exceeding EUR 43 million.
- Within the SME category, a small enterprise is defined as an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 10 million.
- Within the SME category, a micro enterprise is defined as an enterprise which employs fewer than 10 persons and whose turnover and/or annual balance sheet does not exceed EUR 2 million.

(Extract of article 2 of the annex of recommendations 2003, EC)

2.3.1 SMEs adoption of technology

Technology for SMEs is not as easy to adopt as it is for big organizations. SMEs have more technology outsourced and gain more from having it out of house. SMEs adopting technology gives good competitiveness and facilitates expansion to new markets with new opportunities rising. Big organizations that do not fit in the SME criteria often gain more from having in house solutions and do not adopt technology from outside as much. As SMEs also have a limit in manpower against the big organizations it is harder to have personnel to maintain and look after the technology (Thurasamy, Mohamad, Omar, Marimuthu 2009 p. 2-3).

3 Methodology

In the method section, a description of the data collection will be covered. What tools we will use in collecting our data. The analysis methods we used as well as the problems and weaknesses that comes with our different techniques. The research approach which is used will also be covered in this section. The method is a manner or procedure often systematic way of accomplish something (Lekvall Wahlbin 2001 p. 3).

3.1 Research approach

There is two major research approaches to consider when conducting a research. Inductive or deductive research. You either conduct a hypothesis or test your theory or you collect data to form a theory by the findings that you get (Saunders, Lewis, and Thornhill 2009).

Deduction: testing theory

Deductive research refers to testing a hypothesis and confirming a theory already stated. The basic steps involved in a deductive research process are described by Robson (2002):

1. Deducing a hypothesis
2. Expressing the hypothesis in operational terms
3. Testing this operational hypothesis
4. Examining the specific outcome of the testing
5. If necessary modify the theory in the light of the findings

In deductive research the transition is between hypotheses to confirmation of a specific theory. It is often used in scientific research and especially natural sciences (Saunders et.al. 2009).

Induction: building theory

Inductive research focuses on developing its own theory from findings obtained during research like observation or surveys. To have a inductive approach there have to be work done to back up the theory that you come up with. The inductive research is about gaining an understanding of phenomena and meanings of different concepts. The researcher has a bigger role and is involved much more in the process and there is no concern to generalize (Saunders et.al. 2009).

There is the possibility to combine the different approaches to cover more and the advantage of getting a better and more valid research. As deduction can be a lower risk to take because it takes less time and effort, but the inductive research is a risk because there is always an uncertainty of getting the right data needed (Saunders et.al. 2009).

This study intend to explore cloud computing and the adoption process thorough data collection and analyzing by forming our own theory, therefore our research approach is inductive.

3.2 Case study approach

A case study is what we see most fit to this research and our topic. We intend to investigate two different cases, one provider case and one user case in the field of cloud computing. A case study is an intensive evaluation of an independent group in this case, companies. It can be defined as; A case study is a research method that examines contemporary phenomenon within its real-life context, when the boundaries between phenomenon and context is not clearly evident (Yin, 1984, p. 23).

In our case the phenomenon was cloud computing and different views on the adoption. We focused on having two different single cases connected to our research. One provider case where we investigate the adoption process from the providers point of view. The other case of the user where the focus is on the users view on cloud computing adoption. To form these case studies we are interviewing one provider and one user. The providers case is focusing on Scandoc, as the users case are Tre Stiftelser both situated in Gothenburg.

We have two single cases that are connected to each other, the provider case is connected to the user case because they are the provider of a service the user is working with. There is still two single cases and we intend to investigate them as two different cases, to later connect them and find categories that match both of them. Interviews have been made with representatives from the companies, a more detailed description of the cases can be found in case findings.

3.2.1 Triangulation

Triangulation involves using different sources of information in order to increase the validity of a study (Guion, Diehl, McDonald 2011).

According to Denzin (1984) there are four types of triangulation: *Data source triangulation*, when the researcher looks for the data to remain the same in different contexts; *Investigator triangulation*, when multiple researchers examine the same area; *Theory triangulation*, when investigators that have different opinions interpret the same results; and lastly *Methodological triangulation*, when you use different methods in succession to increase the strength in the validity.

3.3 Data collection

The focus is on using qualitative data collection techniques. Qualitative data is data that is focusing on delivering information that can be described with terms and theories. It is not like quantitative research that focuses on the numbers behind a survey or something similar. It focuses on delivering numbers and information in terms of quantity. Qualitative research can be interviews or observations where the research is done on the behavior or theories (Saunders et.al. 2009).

Our research will consist of both primary and secondary data. Primary data is data collected by the researcher using different methods. The primary data that is collected are often more reliable due to that you know where the data comes from and been following the progression all the way. Primary data sources could be (Kelly 2005):

- **Observation**- when observing a system or a research object/field to see the details that is important to a research. Requires a lot of resources and time.
- **Surveys**- written questions that help you collect big amounts of data through sending out or giving an amount of the population the survey.
- **Interviews**- When interviewing you have a personal meeting and can analyze all the expressions of the research object, also the questions can be followed by other questions, it is easier to evaluate answers.
- **Logs**- Can give good data about the system performance in a system, such as error logs, transactions logs and complaint logs.

Secondary data are data that is collected from external sources that already exist. The only thing that has to be done is to look for the data you need. Secondary data has the upside compared to primary that it is cheaper to collect but the reliability, validity and accuracy is

not as great. You do not know where the data actually comes from and cannot fully trust it against primary data where you have more control. Secondary data is easier to obtain and cheaper to get also. Some examples of secondary data (Kelly 2005):

- **TV, Radio and Internet sources**
- **Magazines, Newspapers and Reviews**
- **Research articles**
- **Stories told by people you know**

There is a third data source called tertiary data that is the search tools for obtaining secondary and primary data such as encyclopedias and indexes. Often it is used in literature search when not knowing where to start searching for a specific topic (Saunders et.al. 2009).

Our primary data collection will consist of interviews in different forms and the secondary data collection will be recent articles in the area of cloud computing, internet sources and literature that is within our field of research.

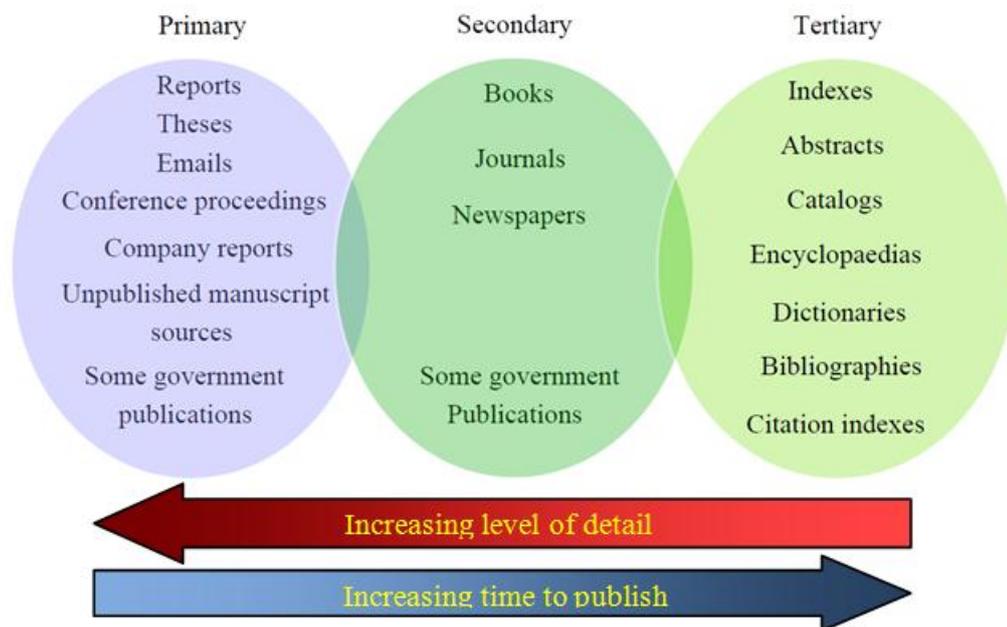


Figure 2 The different literature sources (Saunders et.al. 2009)

There are three different types of studies that can be made, explanatory, descriptive and exploratory, which we will be focused on. Exploratory research answers the question “what” while descriptive wants to actually describe something and explanatory asks the

questions “why” and “how”. As our research question is about finding out the adoption process and the decision behind it, our research is an exploratory research. We will focus on interviews directly with the source, in this case the providers and users of cloud computing. The initial literature we found was most articles and books describing cloud computing and also many papers about the drawbacks and benefits. We think our approach to our research will help us answer our research question in a good way. The techniques we intend to use we feel fit best what we want to get from this investigation.

Interviews can be done in different ways when it comes to research. Open ended, closed, standardized, general and informal interviews. We have chosen to gather most of our information and data in form of interviews because it helps getting to actually talk to someone about a subject. It could be good to have some sort of other gathering method to get better reliability but interviews works as a good source. (Saunders et.al. 2009).

We have conducted interviews with Scandoc AB and our approach was mostly informal in the first interview with some initial questions that were done in beforehand. The purpose of the approach was that we wanted to have the interviewees to take part and talk freely about the subject in their eyes. Trying to get as much data as possible from the sessions. We wrote down the interviews from the talk so we had it in text. It had to be done right away to not lose any data. This process was done two times to make it more reliable and also so we did not lose anything.

The second interview with Scandoc were more focused on structure and prepared questions. We also had an interview with one of their users: Tre Stiftelser from Gothenburg. The interviews and the data we have collected formed a case study were we could make our analysis on, together with the initial data and knowledge we have obtained.

Interview #	Name of the interviewee(s)	Role of the interviewee(s)	Date	Duration	Purpose
1	Nils-Olof Wikström, Martin Wikström	CEO Developer	2012-03-07	43 min	Introduction of business and introduction of the research.
2	Johan Rindborg	Chief of Administration	2012-04-16	28 min	Introduction of user and use of cloud services.
3	Nils-Olof Wikström	CEO	2012-04-18	35 min	Adoption of cloud service, challenges and security.

Table 2 Interview information

3.4 Data analysis

There are many different techniques for evaluating and analyzing data obtained in a research. There are special techniques that fit for quantitative research and those that fit for qualitative research. The data analysis technique must match the general research approach and the collection technique.

There are a number of ways to evaluate and analyze data you obtain. The data analysis can often be either confirmatory or exploratory when analyzing data. Either explore the area or confirm recent studies. (Jackson, Purc-Stephenson, and Gillaspay 2009).

Exploratory data analysis is an approach that describes data in a better form so it is easier to understand. We will focus on analyzing our interviews and the data we collected from meetings with companies along with the secondary data provided directly from the source and also external secondary data that we have found reviews, articles and other literature relating to cloud computing (Jackson et.al 2009).

Furthermore we will use three different approaches within data display and analysis to analyze the exploratory data (Saunders et al., 2007.). First the data reduction technique where

you reduce the data and summarizes the data you have obtained in interviews. After that the step is to use data display to organize the data that have been reduced in visual displays. When going through this process it is easier to thinking about the conclusions of the results. The raw data is much easier to draw conclusions from when reduced (Saunders et al, 2007).

When analyzing data it is important for us to understand the interview we have done and all the information we have gotten from it. We will analyze data so the result will be easy to understand for our audience. For SMEs and providers it is crucial that you understand the results of an investigation like this. Furthermore the focus should be on the different cases we have been given and the interviews we have done to get a good overview to answer the question we have been doing research on.

The analysis technique that is most fit to our approach is the data display and analysis approach. It is most fit to analyze by investigating the answers from the interviews along with secondary data to get more data sources and get better reliability. The data will be divided into categories and presented and linked to the theoretical framework. The interviews will form a provider case and a user case on the subject that is directed to small and medium enterprises.

3.5 Validation

3.5.1 External validity

External validity represents the extent of how an investigation can be generalized to the population and in different settings (Isaac, Michael 1971). There are factors that can affect a study and its validity. A study can have more validity if the study is conducted on a bigger scale. Validity can also be affected by the participants motivation to the research. For example a single case is hard to generalize as it is only looking at one specific perspective.

Internal validity is more focused on explanatory studies and focus on how well the study was done, using research design, definitions and other measures (Campbell, Stanley 1961).

4 Case Findings

This section will present our empirical data and present statements that are important from the transcription. The people and companies that work with cloud computing on a daily basis have different views on what it is and that shows you how unexplored the area is. The data we have collected are from the interviews with Scandoc and Tre Stiftelser. All the quotes we use are the ones we see most important to display.

4.1 Provider Case (Scandoc)

As stated in previous sections two different interviews were done with Scandoc, a developer and provider of cloud computing services. The interviews with Scandoc were done because they are a provider of cloud computing. They are situated in Gothenburg and are focused on Small and Medium Enterprises for their customer base. Scandoc is a small company but with many customers. Two interviews were conducted, one unstructured and one more structured formal interview.

4.1.1 First interview

We came in contact with Scandoc via email and had a meeting in Gothenburg. We wanted to get to know the company and also introduce our subject. The company gave us also a description of their service and their connection to the topic. Initially we asked some questions in preparation to the meeting and they are displayed (see Appendix A). We intended a semi-structured interview but when we came there it became more of a presentation from their part and a discussion between us and Scandoc. We interviewed Scandocs CEO Nils-Olof Wikström and his son Martin Wikström who is the developer in the company.

First the meeting started with the CEO and developer together introduced their company's background and their business idea. Scandoc is a family business with father and son working in the company. They started their business 1998 and at first they had a hard time getting into the market since all technology had a hard time getting accepted. In 2005 Scandoc introduced their service called Billbox™. Billbox™ is a program that scans invoices and administrates invoices with enterprise systems. Initially there was a sense of uncertainty around their product. Scandoc has grown since 2005 and today they have more than 1000 users and the customers are usually small and medium enterprises.

The discussion continued with us wanting to know the adoption process from their point of view and also the complications that existed for a provider like Scandoc. Scandoc's process of getting new customers and implementing their system with the customer has reduced in time a lot. In 2005 when the service was introduced the implementation process from decision to actually using the system, has in time reduced drastically. In the first years a customer could have to wait for 18 months before having their Billboxtm up and running. Today the customer can have the service implemented within a week. The process of how Scandoc get customers is not at all done with the same uncertainty as in the initial years. The CEO thinks that the industry will continue to grow for service providers on the web. When Scandoc get new customers it is often customers who got a recommendation or they have earlier experience. After contact there is an introduction of the services that can be provided and fitted to customer's needs. Some research is done by Scandoc to get an overview of the business structure and systems used (Enterprise systems, Customer relationship systems, Business intelligence systems). Scandoc then gives a demo of the system either in person or remotely to the customer. Scandoc tries to get as much done as possible remotely, everything from customer contact and delivery of the service. To manage their big customer population. After customers get their hand on the system they usually decide and get an initial offer on the cost. The cost is dependable on the rate of work that has to be done to implement the system.

Scandoc has partners that collaborate with them; Jeeves, Canon and Swedish invoice central are some of them. Scandoc has done the product in house and are handling the maintenance all by themselves for all of their customers. Developer Martin Wikström explains that the provider has a lot of responsibility when it comes to reliability. They have thousands of customers and if something happens the connection will be lost for all of them. Therefore it is very important to have a high security level. It is easy for Scandoc to update and maintain as they created the system and can easily make changes.

The intention was to see the provider's perspective on problems and the advantages with the implementation/adoption process and cloud computing in general. They discussed some strengths and weaknesses with cloud computing and being a provider. They strive for a user friendly environment so that customers can use the product in a simple way. The cost is often cheaper when the service is provided in the cloud. As all providers in the mar-

ket know they are in the danger zone for virus attacks, the security must be prioritized because they cannot afford to have downtime too long.

We briefly discussed how Scandoc think the business will evolve and what will happen in the next couple of years in terms of people accepting and using the technology. Scandoc thinks the future for cloud computing is bright. Scandoc themselves has grown a lot the past years with many partners and customers interested in their product. CEO Nils-Olof Wikström says that the service will be directly from the distributor and we will see fewer consultants that act like an intermediary. There is also a pattern that suggests that the time from when a customer wants the service until implementation will be minimal. The customer will do almost nothing in terms of work to get the service. Scandoc also suggests that it can be done by just having a customer filling out a form on the web and then the information are validated and a login is sent out to the user, The user can therefore use the service almost instantly after putting an order through.

4.1.2 Second interview

The second meeting with Scandoc was made with the knowledge from the first interview and also focused more on a structure than the first meeting that were more of a discussion between us. We had initial questions which we asked and recorded the whole interview (see Appendix C). Some questions were repetition of the first meeting but to get it recorded we asked similar questions. Our main focus was to get more and deeper answers from the provider's point of view. This meeting we only interviewed CEO Nils-Olof Wikström.

4.1.2.1 Providers decision to adopt

As we wanted to investigate the adoption process from both the developer's perspective and the users we asked a lot about their process of choosing cloud computing and why they decided to go for cloud computing as their future of business. Scandoc as many other companies in the market decided to start developing cloud computing because of the evolution of the internet and technology in general.

"We saw the development of the internet, it was a little uncertain at first, and communication was not good enough. The customers were not quite ready for it at first either. We quickly realized that it was the quickest way to deploy software changes when you just need to change something in one place and it immediately became easier to maintain. 2004 we

got the idea that we would have our services on the Internet. The driving force was probably that the cloud and those we thought that it would come and get bigger. We saw the potential in it.”

Scandoc reacted to the market and how the business changed, and made progress within their area. They have always moved forward in terms of implementation time and striven for reducing the time further.

“It is one of the drivers, before we went out and visited customers locally and it is never wrong, but today it should be said that 90% of our sales are online. You can take it a step further by having pre-recorded presentations to customers who are satisfied with that kind of approach or that the customer fills out forms themselves where we do the job now.”

They have a reason for wanting easy access to their service, the customer do not have to pay as much because the provider is less involved in the process. This means less man hours in implementation and customization. To make this possible and sustainable the user need to have knowledge of the service and understand how to use it.

“...It's a way to keep costs down for customers of course, while increasing the availability of the service.”

A customer will not buy anything without knowing what it is, and they have to see a need for the cloud service. When customers do not see a need for a cloud service Scandoc usually tries to convince and prove that cloud services is safe and reliable.

“The first option is to point out the advantage of network and cost for the customer and that it skips the consulting fees and such...”

It should be said that many of Scandoc's customers today take contact themselves to get their service, which means there is more acceptance for cloud computing and also more knowledge about how it works.

4.1.2.2 Providers definition of cloud computing

We have come across many definitions of cloud computing during this research. There are many opinions on what is cloud computing and what is not. We had a hard time defining our own; Nils-Olof Wikström at Scandoc defines cloud computing as.

"We think that the cloud itself is a generic term when you have no servers close to or do not have it outsourced. If the product is outside the house in any way in which several can share a single application while connected, then it is a cloud service... When you can work from "A to Z" on the network regardless of where you are, then there is a cloud service. You should be able to go into an internet cafe in Athens and run Billbox for example."

The definition we got from Scandoc implies what they want with their own product; they want simplicity, mobility and scalability. Many of the services provided in "the cloud" have similar goals. Easy to use applications that are safe and easy accessible are very sought after by customers and complex solutions often provided by consultants are not as easy to adopt.

"I believe that the complex solutions that are often provided by consultants cannot be customized just as a cloud service can. Companies are driven by cost and it makes you always look for better, cheaper alternatives."

4.1.2.3 Integration and security of cloud computing

As complex systems are suitable for big complex organizations, SMEs can gain advantage by using an easier solution through the cloud. A cloud service like Scandoc's Billbox™ is also adaptable. Adaptable in the way that it is easy to integrate with the other systems that the users have. Integration is very important because if you have systems that talk to each other you can eliminate unnecessary processes.

"There are indeed more and more demands for products and services that can talk more with each other..."

We asked Scandoc if there is a difference between integration with larger and smaller users.

"...the complexity is always the same for a small company like a large company. That makes us wanting to have larger companies..."

Meaning that their product is very flexible and is not affected by what system a user is running.

Along with the increasing acceptance of the internet, cloud computing was more and more accepted.

“When the paper business started to decline it became more and more accepted with online payments and it has become more of a natural thing for companies to choose this path we are offering.”

There are still issues with the service of course, one major issue is security. Many do not choose cloud services because they believe it is not as safe as having it in house.

“...6 years ago it was probably safer to have the computers in the house but today it's probably the opposite. It is safer and it is much more professional to have their servers outside the house. Often you have solutions in a company whose business idea is to have high redundancy and also to ensure that safety works. It has good bandwidth, you have the latest software, firewalls, and they replace their servers periodically. Not all companies with local installations have this. In some cases the equipment is in a closet where it can get 39-40 degrees and that is not good at all.”

Scandoc actually thinks that it is safer to have services in external places. Many companies that choose to adopt a cloud service do it because they want to get rid of doing maintenance and updates by themselves in house. Then it could be a good idea to let someone with good experience handles that so you can focus work on other tasks. Although many argue that data cannot be shared to external sources and there are often forces within a company that do not want a SLA (Service Level Agreement).

“...I would also like to add that there is often a driving force in the companies to maintain their own IT department. Many still want to have it locally in house.”

It is important for Scandoc to persuade these negative driving forces, often with a demonstration. When having a lot of customers there is a small problem arising with Scandoc maintaining their servers by themselves. But Scandoc have good scalability and do work with high redundancy.

“With good scalability you get better stress handling. Each system has a limit though; it can be solved in several ways, either by getting more servers or update the ones you have.”

The trend of cloud computing is going up and local in house solutions is getting less popular within the markets. The market is hard to investigate and there is not sure cloud computing will grow more. Scandoc confirm their theory more with this statement.

“We have not had any local installations since 2006.”

4.2 User Case (Tre Stiftelser)

Tre Stiftelser is a user of cloud computing and Billbox™. We came in contact with Tre Stiftelser through Scandoc as Scandoc are providers to them. Tre Stiftelser is situated in Gothenburg as well and has been a customer at Scandoc for more than ten years. Tre Stiftelser is a community foundation started in 1726 and work in the elderly care sector. They represent about 7-8 per cent of City of Gothenburg's nursing homes. They have a generic business and do not expand into anything else than the nursing homes. We had an interview with Johan Rindeborg; he is the administration manager of the foundation.

The procedure to be a resident at one of their homes is simple; you get an administrative decision to move there. All the residents living there move in with their own belongings and get to furniture as they like. It could be related to a student housing with a lot of common areas. The residents are mostly elderly people with body health issues and dementia. Some residents are younger with neurological diseases.

The interview with Tre Stiftelser was a structured interview that was recorded. It started with a description of the organization from their side. It was followed by a number of questions with a few counter questions.

4.2.1.1 Users IT structure

Beginning with how their IT structure look, because it is good for us to understand where the need of cloud computing comes into the picture. Tre Stiftelser uses thin clients and do not have anything stored locally at any of their homes. They work towards a central storage that is outsourced from the foundation to external partners and the City of Gothenburg.

"We have an infrastructure that is built based on thin clients; we are running Citrix so we have a centralized IT operation. Nothing is stored locally, it is stored centrally. Everything is processed centrally and we have no self-employed professionals who run and maintain it all, but we outsource thus the operation of the whole. All our staff has their own accounts with the environment in which we have records management, different types of orders, communications, mail and intranets."

Citrix is a type of ERP system that works with Windows and is used by many companies today. We asked Johan Rindeborg how they use their cloud service, Billbox.

"It's all about our supplier invoice processing; we get about 5,000 invoices per year. We have about 12-15 people who certifies the invoices at the three locations. Then it is so that the invoices are made to Bankgiro-

centralen that scans invoices and then goes through a number of steps to end up at our inbox. How Billbox comes in the process, I have no idea but I guess it is between BGC and us.”

It is interesting to see how the user interpret a cloud service like Billbox, because they have been working with the application for about 10 years but still do not really know how it works, just that it works. The application works totally by itself in Tre Stiftelser and do not need much interaction from the user. There are companies that have a lot of interaction but in many cases it is just about what the results turn out to be. Tre Stiftelser have several systems out of house and uses systems that support bigger business processes than invoice handling. But again they do not care about or see a difference in where the systems are running.

“...We notice's no difference where the software is hosted.”

4.2.1.2 Users adoption decision of cloud computing

The implementation and decision behind these systems being adopted is not extensive either. The user decides to adopt an outsourced service like cloud computing and do not really care how the provider does the results.

“There is no difference. As a user, you will see no difference where the server is located; you can only see what comes up on the screen. How the process looks like is not interesting for us. We just want the bill to be visual to us.”

“We have no policy of using cloud computing, it does not matter to us if we have it in the cloud or ourselves as long as we get a good quality.

Where each software executes does not matter to us.”

Johan Rindeborg wanted to emphasize that very much that the important aspect for them as a user it is not important who is maintaining and providing a service, the important thing is that the work that they want done is supported by the service that is provided. If the service is a cloud service or another type of service is not important, at least not for Tre Stiftelser. Although the decision behind the adoption of the service came for the purpose of not having to physically do some processes and instead use a service to save time and focus on other tasks in the company. A theory adopted by many others in business.

“Physically, we will not have scratching up the envelope and administer invoices now that it is computerized. But that has nothing to do with cloud computing.”

To make the connection to cloud computing, this is a very common way of thought. To replace a process with a cloud service to save work load. It is not about cloud computing technically but the decision behind adopting it.

4.2.1.3 Security and integration of the user

We also asked about security and what their view on it. Johan Rindeborg explained from Tre Stiftelsers view that it does not matter when it comes to Billbox but they have other systems that is more supporting to the business.

“For us there is no difference in having it with us. Billbox is not in real time as it gets in when it comes and it does not affect us significantly if their systems are down. The salary system is much worse for where we are running continuously, it is the system down for ten minutes, you will notice throughout the organization...”

There is a risk affiliated with having outsourced systems and applications for Tre Stiftelser, but it is seldom any downtime in their systems.

4.2.1.4 User definition of cloud computing

Johan Rindeborg gave us his thought on a definition of cloud computing. It is similar to many we have encountered in our literature search. But as stated before in the paper, there are many views and many different definitions.

“I identify a cloud service where I cannot directly point to something where I do not have a risk associated with a physical server, but where I have a drive that is shared in many places.”

A not so technical aspect but a good description of what a user thinks about cloud computing. Lastly to sum up the interview we made, we got many good points although a lot of repetition. That the users do not really care from where the service comes from. There is just one priority for the user.

“There is no issue for us because we do not care about where exaggeration is done; we just want it to work. It is only the experience that is important for the user. It should work 24/7, that is the priority.”

A statement that enhances this statement, along with security and simplicity the main priority for a system from a user’s perspective is that the service provided to work all the time. There is a knowledge about cloud computing with the user, some users do not really care what type of IT that is used, the interview with Tre Stiftelser did not give us the answers we thought but it gave some good points. We talked about the cloud computing general issues

like security along with ease of use and how well the system can be adopted by a user. The interview as a whole is presented in Appendix B.

5 Analysis

In the analysis parts we will with our own words describe and connect our data to answer our research question. We will evaluate the answers we got in our empirical data and link them to the framework. The data is reduced and visualized in Table 3. The categories are the most important aspects of the adoption process. The decision to adopt is done by taking these categories in account both as provider and user. Even though user perspective is much different from the provider’s perspective. The categories is then explained and compared from both perspectives.

5.1 Category table

Categories	User	Provider
Decision Process	The decision to get cloud computing is made because companies want to optimize processes and get rid of hardware in house.	Evolution of technology and the internet has made cloud computing more available, sometimes it is only one click away.
Definition of cloud computing	The user defines it as a solution where there is no risk on the physical server you use and the drive can be shared in many places.	The provider defines it as a service that does not have servers in house which you use remotely and can access from anywhere.
Integration & security	“It depends on what type of cloud service you use, because the service we use is not in real time and do not require as high security level”.	“Security is not as big of an issue as it was before; it is safer to have IT outsourced. The companies you hire have as a business plan to have a high degree of safety throughout”.

Adoption	Users often adopt cloud computing to make business processes more efficient, for example replacing administrative tasks.	The provider are always strives for having less implementation time, making the service more easy accessible and user friendly.
Future development	As long as the service works there is no need to think about future development, a user talk continuously with providers to see what can be done better.	Providers in the area of cloud computing is continually working on getting better and they believe that cloud computing are the future.

Table 3 Cloud computing adoption categories table

5.2 The findings

The data from the data collection is specific to our cases and has given us understanding in how the decision process looks like and why a company decides to adopt cloud services. The data gave an understanding in the topic of cloud computing and the usage of cloud services. The data collected from the interview with the user was not as elaborative and giving as we hoped for since there might have been a slight misunderstanding of the concept of our research. The result gave us new perspectives of the how cloud computing is seen from the business world and in how many ways it can be used. We found before our research that some companies were hesitant to move their IT into the cloud; therefore we wanted to find information about the adoption process of cloud services. The collected data have in many ways fulfilled that expectation by talking to a provider and by getting the user perspective on why the company decides to adopt cloud services.

5.2.1 Fulfillment of purpose

The purpose with our research was to answer the research question and to get a better understanding of the IT adoption of cloud services. The purpose was to fill a knowledge gap with finding out the decision process of adopting cloud computing. Our findings are sufficient enough to be able to fulfill the purpose as the quality of the empirical data was very helpful. The results that we have been able to find are decisions that are crucial to choosing to adopt cloud computing.

6 Discussion

The discussion part will go deeper into the categories presented in analysis and this part will list all of them and explain more of each category. The categories provides the information necessary to be able to create a process of adoption of cloud computing. The categories are the important aspects to consider when adopting cloud services.

6.1 Cloud service adopting categories

6.1.1 Decision process

The decision process is a category that describes the initial decision to implement cloud computing. What are the advantages to get a cloud service or to start providing it? The decision to adopt cloud computing from a provider's point of view is mostly because the evolution of information technology is more accepted. As providers work towards making the implementation time smaller for a cloud service, users understand that the step to implement cloud services is getting smaller. Before the provider could to wait for weeks before getting a decision from a customer but today the customer can order and start using services without actual involvement from the provider.

Users can now see a need and it makes more sense to adopt a service that is so easy to adopt and easy to maintain as cloud computing. Today customers have some knowledge of what cloud computing involves and want to use it to change parts of their business processes. There are users that are hesitant when taking the decision to implement a cloud service; this can be a result of lack of knowledge. Providers work tries to get knowledge across to make the decision process for customers faster and easier. Some users do not care about the technical aspects of a service when deciding that they want to outsource. That's why they outsource it, to not have to think about it.

6.1.2 Definition of cloud computing (knowledge)

We have during this research come across several different views on cloud computing. The user perspective is not always the same as the providers view. The provider often states a technical definition that describes the service in depth while the user is mostly general and therefore they have a more general definition. Here is a knowledge gap, as providers may have a better understanding of the subject and it could be difficult for some users to under-

stand the technical parts of the service. With no understanding, the user will not decide to adopt cloud computing.

This is not the case for all relations, customers are aware of what cloud computing is but it is still important to consider that it can be differences in customers and their understanding. Apart from getting a qualitative service, users want to know what it is and know that it will work. It is important to find a balance between the technical and the more general description. Many times it is good for the provider to get in contact with the customer and have a conversation to eliminate misunderstandings.

6.1.3 Integration & security

The integration for the user is not as big of an issue as it is for the provider. The provider works continually to get their cloud service to work against the users existing systems. Integration is important but it is not as big of an issue as security since security is a high priority for many users. Users with an IT department can be very protective about their data and want to have high level of security to be sure that no data get in the hands of other people or organizations. There could be information about customers and suppliers along with all their financial information and similar data.

The level of security has increased when it comes to cloud computing through the years. According to our secondary data findings many users have the perception that security is a mayor issue when adopting cloud computing. Actually according to our sources of primary data it is the opposite in today's market. It is often safer than many think it is because if an organization decides to outsource IT solutions to an provider, that provider has a professional IT infrastructure. Not only that but they have as a business strategy to keep their servers, data and other hardware safe. There are often data centers with state of the art cooling systems to keep servers in good. This hardware and software do not come cheap to a SME and it could be better to decide to outsource services and hardware. Bigger companies with big data centers of their own can manage to keep security high, but SME usually have a larger need to outsource than keeping IT in house.

Managers, CIOs and owners are concerned with the data and do not trust providers with keeping the data safe, to a provider this can be of concern. There need to be a high level of communication between providers and users about the service and safety that they can

provide, because trust is essential. Cloud services need to come with a service level agreement so that there is no doubt what happens if something in the process goes wrong.

Support is another important issue; cloud services are often kept very simple and can mostly run by itself. The reason for this is that the provider can cut down on support. As the technical parts do not concern the user, and the interface is often kept simple, the level of needed support is lower than other applications that are not in the cloud. With that said there are no guarantees for the security to be up all the time, the security is always a risk and there are always threats that arise.

6.1.4 Adoption

The adoption in this context is going from not using cloud computing to use it. Users have a reason for adopting cloud computing into their business. In most cases there is a business process that can be replaced with a cloud service to get a cheaper and a more effective way of doing a particular business process. Like in our case Tre Stiftelser started adopting Scan-doc's cloud service to get rid of the physical work of administrating invoices. The upside of course being that there is other work that can be done in the organization when a process gets automated or more easy to handle with a system in motion. Another very good reason for SMEs to adopt cloud computing is the possibility to have IT infrastructure out of house, or just some parts of the system out of house. Many times this is much preferable to have infrastructure out of house because you do not have to maintain the hardware or software by yourself. The in house solution is often expensive and hard to maintain for a smaller company. That is why cloud computing is a good option since you do not have to worry about the technicalities as a user.

The provider handles everything and sometimes the trust for the provider is questioned because of this. Safety is much better within the cloud compared to having everything in-house. It is more expensive for an SME to have good security if having infrastructure in-house. Providers focus on that their applications are easy to use, safe and that they work 24/7. The services that can live up to these standards do have more time to maintain the systems technically. If there are no questions from their customers there are less calls to the support and more time to maintain the hardware and software.

The providers of cloud computing focus on making the usage of the service as simple as possible, the implementation time for a cloud service is often very quick because there is

only a short installation time. The application is already installed but then distributed through the network. This gives cloud computing an upper hand because they can demonstrate to the customer before a customer decides to purchase and can actually show how the application works in real time. Cloud service providers will continue to work on decrease adoption time and increase the simplicity. Customers can in some cases without involvement from the provider fill out a form and then click on a button to start using the application instantly. A huge advantage in a fast paced market.

6.1.5 Future development

Users do not care about future development as long as their service works. There is continuous communication with providers to make IT evolve in the business. The providers think cloud computing will continue to growing in business usage and that more and more application will end up in the cloud. The trend right now is cloud computing and in house solutions are either outsourced or cut. As the mobile trend is growing the cloud computing trend is growing with it.

Providers do think there is a big potential in cloud computing and think this is the next big product when it comes to SMEs information technology. They see a trend that consultants will be needed less as solutions can be sold without hardly any involvement from the provider.

6.2 Process of adopting cloud computing

The purpose of this research was to gain a better understanding of cloud computing and the process of adopting it. We have collected data that we can use to describe the process of adopting cloud computing and the decision behind it. The following process is the process that we have put together with the help of the data collected from the interviews. This process describes the adoption of cloud computing but could be applied for other services also. The main focus for this thesis is the cloud computing perspective and that is what will be covered.

6.2.1 Initial stage

The process is first initiated by an organization because there is a need for a cloud service, or a cloud service is the best way to fulfill a need. The initial stage or the initial decision to adopt a cloud service is continuing with collecting information about the subject and con-

vert it into knowledge that can be applied to their business. The knowledge varies depending on the organizations size, the size of the service and past experiences of cloud services. The initial stage length is dependent on the scale of the product or service and the need of the customer and the prior knowledge of the customer.

6.2.2 Requirement specifications

Knowing what the service is needed for is important when listing the requirements. Requirements could include; scale of the service, integration, security and functions of the cloud service. This stage involves a dialog between the provider and the user, the provider often gives guidelines and recommendations for the best solution. The providers tailor a solution or provide standard solution for the user to consider. This process also includes viral demonstration of the service of how it actually works.

6.2.3 Implementation

The implementation stage has been reduced extensively over the past years. Providers and users have less contact and the implementation can be done completely on a remote location. An implementation of a cloud computing service is fast and the difference between large and small solutions is not significant. The service can be provided fast even if it is a bigger service solution. Since this stage is fast and the user is not involved it does not require that much attention.

6.2.4 Maintenance

After the service has been set in motion at the user, there is still work to do to keep the system clean and updated. Maintenance do not require a lot of attention from the user, the provider handles everything from updates and virus protection. This stage focuses on providers making updates with no involvement from users. They are just notified about changes that have been made or are going to be made.

7 Conclusion

In our research we have investigated the different concepts of cloud computing and the adoption process. In today's information technology based businesses there is a lot of confusion on the term cloud computing. Cloud computing has different meaning to different minds. It is not a surprise that this is the fact as it is an unexplored area in IS technology. There is hesitation when wanting to adopt or when deciding on what IT solution to adopt in different organizations.

In this study research has been made on the decisions behind adopting cloud computing and the actual process when getting such a service. We have looked both providers and users perspective. We used secondary data from past research and articles in the subject. For the data collection of primary data we have conducted mostly semi-structured interviews. We interviewed both provider and user of cloud computing to better understand the process, attitudes of adopting and the future development in the field of cloud computing. With our data we answer our research question by coming up with a simple adoption process and categories that lay ground for decisions to adopt a service in the clouds.

We found that the adoption is simple in technical terms and for the user the adoption is not as extensive as many believe. Cloud services are a good option for SMEs since they can save money in hardware and software investments. Providers handle maintenance remotely and the need for support is minimal. Both providers and users value simplicity, security and that it works 24/7. It is important for providers of cloud services to consider these key aspects. As users keep accepting IT and the use of web applications, an increasing number of organizations are adopting cloud computing. A good alternative versus in house solutions for most SMEs. Although there is many in house solutions with good points.

7.1 Contribution of the research

With this paper we have fulfilled our purpose and have come up with an adoption process to cloud computing also categorizing the subject and looking at the important decision behind it. This research can be used by both provider and user of cloud computing to better understand and know how the process looks like. The research may help organizations see the risks of adopting and the upsides of choosing a cloud service. The adoption process confirms the secondary data we have collected because the process in general and not so unlike other adoption techniques. Even though that cloud computing can be viewed as

complicated it is not. The mayor concern is the categories that help companies to see the benefits and risks when going through this process. The results of this study can be applied to many similar cases but it is not generalized to the whole field of cloud computing.

7.2 Future research

This research has been done on two different cases with one provider and one user. This area can be more explored. There is still much to be learned by cloud computing, it is a new kind of service in the IS technology market and do have issues that can be researched even more. The security and legal issues are other interesting areas within cloud computing. For other future investigations it would be good to use a different case study approach. A more broad case with multiple users and providers to see if the results are confirmed on a broader level. Cloud computing has come a long way in a short time and still can continue to grow. To better our own research and give it a more broad view of the adoption process we could have included more cases. More interviews from different markets could be explored more. This would have been hard as all users and providers do not provide/use the same type of cloud service (public, hybrid, servers, applications).

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Appendix A: First interview with Scandoc (English)

Can you tell us a little about your business?

- What type of service do you provide?
- Why do you use these services?
- Do you develop your own services or do you have a license from other developers?
- What type of customers do you have?

How do the process look from the time a customer take contact with until the actual implementation?

Why have you chosen to develop cloud computing?

What is the response from your current customers?

Do you have any customers that would be willing to take part in interviews related to the area?

Appendix A: First interview with Scandoc (Swedish)

Kan ni berätta lite om vad ni gör?

- Vilken typ av tjänster erbjuder ni?
- Varför just dessa tjänster?
- Utvecklar ni egna tjänster eller är de utvecklade av andra företag?
- Vad har ni för kunder?

Hur ser processen ut från att en kund kontaktar er till att implementeringen är klar?

Varför molntjänster?

Hur är responsen från era kunder?

Har ni några kunder som skulle vilja ställa upp på intervju inom adoption process för molntjänster?

Appendix B: Interview with Tre Stiftelser (Swedish)

Kan du börja med att beskriva er verksamhet?

Vi är en kommunal stiftelse, vilket betyder att Göteborgs stad utser vår styrelse. Göteborgs stad har belysningsrätten, vilket betyder att du bor här på samma premisser som alla andra äldreboenden i Göteborgs stad. Vi startade 1726 som Göteborgs stads fattighus, vid fattighusås borta vid Ullevi. Vi representerar cirka 7-8 procent av Göteborgs stads totala äldreboendeplatser. Vi finns på tre ställen, här på Per Dubbsgatan, på Vegagatan vid Slottskogen och på Stenugnsundsgatan i Härlanda. Man flyttar till oss efter ett myndighetsbeslut där man får rätt till ett visst boende. Så flyttar man hit och får sitt eget boende, sin egen lägenhet, och man får ta del av gemensamma utrymmen. Det påminner en del om studentboende. Alla ytor är de boendes ytor så vi jobbar alltid hemma hos de boende. Man tecknar ett konventionellt hyresavtal. Man flyttar in med sina egna kläder, sängkläder, möbler. Det är ett eget boende men med en väldigt omfattande omvårdnadsinsats. Vi har både kroppssjuka och demenssjuka och vi har även psykvård för äldre psyksjuka. Vi tar även emot yngre människor, och med yngre människor menar vi människor under 65 men över 18 år och de ska ha medfödda neurologiska sjukdomar

Hur ser IT verksamheten ut på företaget?

Vi har en infrastruktur som är uppbyggd baserad på tunna klienter, vi kör Citrix så vi har en centraliserad IT-drift. Ingenting lagras lokalt utan det lagras centralt. Allting processas centralt och vi har ingen egen anställd personal som sköter det hela utan vi outsourcar alltså driften av det hela. Alla våra medarbetare har egna konton i miljön där vi har journalhantering, olika typer av beställningar, kommunikation, mail och intranät.

Hur använder ni er utav Billbox?

Det handlar då om vårt leverantörsfakturaflöde, vi får cirka 5000 fakturor per år. Vi har ungefär 12-15 personer som attesterar dessa fakturor på de tre adresserna. Då är det så att fakturorna ställs till Bankgirocentralen som scannar fakturorna och sen sker ett antal steg sen kommer det till vår inkorg. Hur Billbox kommer in här har jag inte en aning om men jag antar att det ligger mellan Bankgirocentralen och oss.

Har ni några andra liknande tjänster som Billbox där ni har driften outsourcat?

Vi har hela vår personal och lönesystem som är outsourcat till Göteborgs stad och vi betalar ut cirka 600-700 löner varje månad. Där har vi ett antal system, både från Timeshare och Personec. Vi märker ju ingen skillnad var mjukvaran sköts.

Hur såg beslutsprocessen ut när ni bestämde er för molntjänster och hur länge har ni använt det?

Vi började för ungefär 10 år sedan när vi ville börja scanna fakturor för att vi ville ha en rationell hantering av fakturor i organisationen och komma bort från de bruna interkuverten och kunna få en återsökningsmöjlighet. Vi ville få ett beslutsstöd i konteringsprocessen så att fakturan konteras när den ankommer istället för när den attesteras. Tidigare skede i processen får en adekvat kostnadsfördelning. Vi började med en egen scanner och scannade fakturorna själva, sen i något skede började Scandoc scanningen och sedan 2 år scannar Bankgirocentralen fakturorna. Huruvida vi scannar fakturorna själva och använder en egen applikation eller att någon annan sköter processen och fakturorna kommer till oss. Det är inget val som är intressant för oss, vi vill bara få fakturan.

Hur ser ni som användare på implementeringen?

Det är ingen skillnad. Som användare ser du ingen skillnad var servern ligger, du ser bara vad som kommer upp på skärmen. Hur processen ser ut är ointressant för oss. Vi vill bara att fakturan kommer fram till oss.

Hur ser ni på användarvänligheten?

Vem som erbjuder tjänsten är ointressant så länge det som kommer upp på skärmen fungerar. Det kan ju skilja oerbört mellan applikationer men vem som erbjuder tjänsten är oviktig.

Hur har molntjänsterna påverkat processerna i ert företag?

Rent fysiskt så slipper vi sprätta upp kuvert och administrera fakturorna nu när det sker datoriserat. Men det har ju inget med Cloud computing att göra.

Hur ser ni på säkerhet, om det händer något och ni inte har kontroll på problemet.

För oss är det ingen skillnad på att ha det hos oss. Billbox sker ju inte på realtid så det kommer när det kommer och det drabbar inte oss märkbart om deras system ligger nere. Lönesystemet är mycket värre för där kör vi kontinuerligt, är det systemet nere i tio minuter så märker hela organisationen det. Men Billbox skickar bara fakturorna en gång om dagen så vi jobbar inte mot Billbox utan får bara fakturorna levererade.

Hur ser beslutet ut att använda molntjänster?

Vi har ingen policy för att använda Cloud computing, det spelar ingen roll för oss om vi har det i molnet eller själva så länge vi får en bra kvalitet.

Var programvaran exekveras spelar ingen roll för oss.

Jag identifierar en molntjänst som där jag inte direkt kan peka på något, där jag inte har en risk kopplad till en fysisk server utan där jag har en drift som är delad på en mängd platser.

Hur ser du på framtiden för molntjänster?

Det är ingen fråga för oss för vi bryr oss inte om var drifter sker, vi vill bara att det ska fungera. Det är bara upplevelsen som är viktig för användaren. Det ska fungera 24/7.

Appendix B: Interview with Tre Stiftelser (English)

Can you begin by describing your business?

We are a community foundation, which means the city of Gothenburg appoints our Board. Gothenburg city have occupancy rights, which means staying on the same terms as all other nursing homes in the city of Gothenburg. We started in 1726 as City of Gothenburg's poorhouse, at Fattighusås near Ullevi. We represent about 7-8 percent of the City of Gothenburg's overall nursing home places. We are located in three places, here at Per Dubbsgatan on Vegagatan in Slottsskogen and at Stenugnsundsgatan in Härlanda. People move to us after an administrative decision where you can get right to a resident. So they move here and get their own housing, their own apartment, and you have to take some of the common areas. It reminds a lot of student housing. All surfaces are the residents' faces, so we are always working at the home of the residents. You sign a conventional lease. People move in with their own clothing, bedding, and furniture. It is an independent living but with a very extensive care effort. We have both body disease and dementia and we also have mental health services for elderly psychiatric illness. We also accept younger people, and with young people, we mean people under 65 but over 18 years and they should have inherited neurological disorders.

How do IT operations look like in the company?

We have an infrastructure that is built based on thin clients; we are running Citrix so we have a centralized IT operation. Nothing is stored locally, it is stored centrally. Everything is processed centrally and we have no self-employed professionals who run and maintain it all, but we outsource thus the operation of the whole. All our staff has their own accounts with the environment in which we have records management, different types of orders, communications, mail and intranets.

How do you use Billbox?

It's all about our supplier invoice processing; we get about 5,000 invoices per year. We have about 12-15 people who certifies the invoices at the three locations. Then it is so that the invoices are made to Bankgirocentralen that scans invoices and then goes through a number of steps to end up at our inbox. How Billbox comes in the process, I have no idea but I guess it is between BGC and us.

Do you have any other services similar to Billbox where you have the operation outsourced?

We have all our personnel and payroll system that is outsourced to the city and we pay around 600-700 salaries each month. We have a number of systems, from both Timeshare and Personec. We notice's no difference where the software is hosted.

What was the decision when you decided to adopt cloud services and how long have you used it?

We started about 10 years ago when we wanted to start scan invoices because we wanted a rational processing of invoices in the organization and get away from the brown internal envelopes and be able to get a trace back ability. We wanted to get a decision in the accounting process so that the invoice gets to the accounts when it arrives rather than when it is certified. Earlier stage in the process, an adequate cost allocation. We started with your own scanner and scanned invoices themselves, then at some point Scandoc began to scan and then two years ago scanning is made by Bankgirocentralen. Whether we scan the invoices them-

selves, or use our own application or that someone else is carrying out the process and invoices to us. There is no choice that is interesting for us; we just want to get the invoices scanned.

What's your view as a user on the implementation?

There is no difference. As a user, you will see no difference where the server is located; you can only see what comes up on the screen. How the process looks like is not interesting for us. We just want the bill to be visual to us.

How do you see the ease of use?

Who is offering the service is irrelevant as long as it comes up on screen acting. It can vary tremendously between applications but who is offering the service is unimportant.

How have cloud services affect the processes in your company?

Physically, we will not have scratching up the envelope and administer invoices now that it is computerized. But that has nothing to do with cloud computing.

How do you see the security, if something happens and you do not control the problem?

For us there is no difference in having it with us. Billbox is not in real time as it gets in when it comes and it does not affect us significantly if their systems are down. The salary system is much worse for where we are running continuously, it is the system down for ten minutes, you will notice throughout the organization. But Billbox just sends invoices once a day so we do not work against Billbox all the time.

How does the decision of using cloud computing arise?

We have no policy of using cloud computing, it does not matter to us if we have it in the cloud or ourselves as long as we get a good quality.

Where each software executes does not matter to us.

I identify a cloud service where I cannot directly point to something where I do not have a risk associated with a physical server, but where I have a drive that is shared in many places.

How do you see the future for cloud services?

There is no issue for us because we do not care about where exaggeration is done; we just want it to work. It is only the experience that is important for the user. It should work 24/7, that is the priority.

Appendix C: Second interview with Scandoc (Swedish)

Hur och när kom ni in på molntjänster?

Vi såg utvecklingen inom internet, det var lite ovisst till en början och kommunikationen var inte tillräckligt bra. Kunderna var inte riktigt mogna för det till en början heller. Vi insåg snabbt att det var det snabbaste sättet att distribuera programförändringar när man bara behöver ändra något på ett ställe och det blev genast lättare att underhålla. 2004 så fick vi idén att vi skulle ha vår tjänst på internet. Drivkraften var väl molnet och att vi trodde på att det skulle komma å bli större. Vi såg potentialen i det.

Intressant och se hur implementerings tiden har gått ner genom åren när det gäller många IT-tjänster.

Det är en av drivkrafterna med, förr så åkte man ut och besökte kunderna lokalt och det är aldrig fel men idag så ska det sägas att 90 % av vår försäljning sker via webben. Det går att ta det ett steg till genom att ha färdiginspelade presentationer till kunder som är nöjda med det eller att kunden fyller i formulär själva där vi innan gjorde jobbet. Det är ett sätt att hålla nere kostnaderna för kunden. Även öka tillgängligheten för kunden. Det öppnar idag upp för mindre kunder. Förr kunde en offert ligga på en kvarts miljon och då nappade inte många kunder. Idag ligger anslutningsavgiften på runt tiotusen kronor.

Har ni sett att kunder är mer villiga nu än tidigare mot molntjänster?

Ja det var mycket osäkert, det var inte heller konstigt för att det började med att det var väldigt populärt att kapa sidor och det är det än idag. Men idag har säkerheten ökat, FBI och svenska SÄPO har engagerat sig i jakten på hackers. Det fanns till exempel en osäkerhet för att betala sina räkningar på internet även andra ekonomiska transaktioner. Men när det började ändras från att skicka brev så blev det mer och mer accepterat med internetbetalningar och det har blivit mer av en självklarhet för företag att välja denna väg.

Jag skulle också vilja lägga till att det ofta finns en drivkraft i företagen att behålla deras egna IT avdelning. Många vill fortfarande ha det lokalt.

Har ni sett att småföretag vill använda sig mer av Cloud computing? För att slippa ha stora kostnader och servrar själva.

Kommer mer och mer, Jag kan säga såhär att det märks väldigt tydligt bland affärssystemen. Det finns väldigt många företag som fått framgång med detta, d.v.s. att man vill skapa portaler med flera olika funktioner för småföretagare. Med en singel log in, alltså när man loggar in en gång så är man inne i portalen då man kan köra alla funktioner där i. Den processen pågår nu kan man säga.

Har du någon speciell definition på Cloud computing eller som du känner beskriver ämnet på bästa sätt?

Det var roligt att ni ställer den frågan för Cloud computing kan man säga myntades utav Microsoft, och Bill Gates. Sen så har Microsoft tyckt att det ska vara det enda molnet. Folk ska hänvisa till molnet och mena Microsoft. Microsoft Azure är deras nya plattform där de vill att det ska finnas mätbart utformat en tjänst där man kan köpa virtuella servrar med mera. Många företag tror då att det är Cloud computing endast i Microsoft. Vi tycker att molnet i sig är ett allmänt begrepp när man inte har servrar nära sig eller inte har den outsourcad utan att ens produkt ligger utanför huset på något sätt där flera kan dela på en applikation samtidigt i tjänsten, det är en molntjänst.

Det finns många åsikter på vad som egentligen är en rätt definition, vad säger du om det?

Det finns många som kör vissa tjänster lokalt och sen vissa tjänster i molnet och kallar allt de gör för i molnet, men då är det ingen riktigt molntjänst. Då pratar vi om äkta och oäkta molntjänster. Programvaran ska vara tillgänglig i nätet och då kallas det molntjänst.

När man kan utföra arbetsuppgifter från "A till Ö" på nätet oberoende om var du befinner dig, då är det en molntjänst. Du ska kunna gå in på ett internetcafé i Aten och köra Billbox till exempel.

Tror ni att det här är en grej som kommer ta över marknaden för företag?

Ja jag tror att de komplexa lösningarna som ofta erbjuds av konsulter inte kan bli customizade på samma sätt som en molntjänst lika lätt. Företag drivs av kostnadseffektivitet och det gör att man alltid letar efter kostnadsalternativ som låga i en produkt som motsvarar förväntningarna som finns. Jag tror mer och mer går igenom luften, alltså utan kablar.

Cloud computing har bara börjat och jag tror att det kommer gå mer mot att man kan välja mer och köpa bitvis av olika tjänster och göra det på nätet. Som det mesta så går det mesta mot flyttbara grejer, t.ex. som din iPad.

Hur är er tjänst att koppla ihop med affärssystem? Är det lätt och vilka frågor får ni från kunder?

Det är en bra fråga! Det ställs ju mer och mer krav på produkterna och tjänsterna att systemen ska prata mer och mer med varandra. Vissa saker har inte gått så fort fram som man trodde, t.ex. som EDI har inte alls gått lika fort fram.

Är det skillnad på integreringen från en större användare till en liten användare?

Nej, det är också en intressant fråga för komplexiteten är alltid lika stor för ett litet bolag som ett större bolag. Det gör ju såklart att man hellre vill ansluta till större bolag. Ju mer fakturor de har, ju större kunder är de. Det blir inte mer komplext för det.

De större bolagen ställer kanske större krav på viss typ av redovisning och realtids uppdatering av projekt. Men idag är det effektivt för oss att integrera med kunder.

Vi arbetar mycket med redundans, att om något går ner i ledet ska det finnas en backup. Vi har haft ett allvarligt avbrott och då blev det väldigt mycket samtal till kundservice.

Hur säkert är molnet och tycker du att det är säkrare än att ha det i huset?

För 6 år sen var det nog säkrare att ha datorerna i huset men idag är det nog tvärtom. Det är säkrare och det är betydligt mer professionellt att ha sina servrar utanför huset. Därför ofta har du dem i ett företag som har som affärsidé att ha hög redundans och där man ser till att säkerheten fungerar. Man har bra bandbredd, man har senaste programvaran, brandväggar, man byter ut sina servrar med jämna mellanrum. Det är inte alla bolag som gör det för vi har haft lokala installationer där det står utrustning i en garderob då det kan bli uppemot 39-40 grader och det är ju inte alls bra.

Användarna vill att det ska vara enkelt, säkert och att det ska funka!

Precis! Och man ska lätt kunna återskapa grejer. Det håller jag med om!

Hur klarar systemet flera användare? Syns det i systemets prestanda?

Det du frågar om är något som heter skalbarhet, det har mycket med databaskonstruktion att göra och ju mer skalbart ett system är desto högre stresstolerans finns det i systemet. Varje system har en gräns, det kan man lösa på flera sätt, antingen genom att skaffa flera servrar eller uppdatera dem du har. Billboxtm uppgift går inte långsammare än så länge. Vi räknar med att om ett antal år när vi har mer transaktioner tror vi att det kommer att gå lite långsammare, och därför bygger vi redan nu på en ny version för att vara förberedda. Det går inte vänta på att problemet ska komma.

Det behöver inte heller vara så att det går långsammare i prestandan utan det kan vara andra problem som uppstår t.ex. deadlocks. Exempelvis att en sökning har gjorts och man får inget svar.

Säkerheten är ett problem när det gäller cloud computing enligt många, vad har du att säga om det?

Idag testar systemen själva lösenord och liknande, systemen idag kan upptäcka om det blir attackerat. Våra system har detta och kan när det känner av intrång skicka IP adressen så man får platsen där attacken gjordes från. Om man kollar på våra trafikövervakning på systemet kan man se att varje minut över hela världen så är det åtminstone mellan 10-100 attacker på våra databaser och hemsida.

När en kund verkligen vill ha det i huset hur brukar ni övertala de att cloud computing är rätt alternativ?

Första alternativet är att påpeka nätet och kostnadseffektivt för kunden samt att man skippas konsultkostnader och sådant. Är det någon kund som vill ha det lokalt och är villiga att betala för det så gör vi det, vi har den policyn. Vi har haft några kunder som vi diskuterat med och som för att hålla det säkert vill ha det i huset och ofta talar om att de har hört alla möjliga grejer om cloud computing. Men när man börjat föra en dialog med kunden så till sist säger de så att faktiskt är det ökad säkerhet att ha det utanför huset.

Vi har inte haft några lokala installationer sedan 2006.

Appendix C: Second interview with Scandoc (English)

How and when did you get into cloud computing?

We saw the development of the internet, it was a little uncertain at first, and communication was not good enough. The customers were not quite ready for it at first either. We quickly realized that it was the quickest way to deploy software changes when you just need to change something in one place and it immediately became easier to maintain. 2004 we got the idea that we would have our services on the Internet. The driving force was probably that the cloud and that we thought that it would come and get bigger. We saw the potential in it.

Interesting to see how implementation time has passed down through the years with regard to many IT services.

It is one of the drivers, before we went out and visited customers locally and it is never wrong, but today it should be said that 90% of our sales are online. You can take it a step further by having pre-recorded presentations to customers who are satisfied with that kind of approach or that the customer fills out forms themselves where we do the job now. It's a way to keep costs down for customers of course, while increasing the availability of the service. It will open up possibilities for smaller customers. Previously, an offer could be at a quarter of a million SEK and it did not attract many customers. Today, the connection fee is around ten thousand SEK.

Have you seen that customers are more willing now than before to the cloud?

Yes it was very uncertain at first because of hackers constantly trying to hack web pages. But today, security has increased, the FBI and the Swedish FBI has engaged in the hunt for hackers. There was an uncertainty in paying the bills and handling other financial transactions. But when the paper business started to decline it became more and more accepted with online payments and it has become more of a natural thing for companies to choose this path we are offering. I would also like to add that there is often a driving force in the companies to maintain their own IT department. Many still want to have it locally in house.

Have you seen that small businesses want to make more use of cloud computing? In order to avoid having high costs and the servers themselves.

It is an upcoming trend; I can say that it is seen clearly among business systems on the market. There are many companies that had success with this, i.e. that you create portals with multiple features for small business owners. With a single log in, then when you log in once, you're inside the portal where you can run all the functions needed inside. We are in the process were this kind of systems get popular.

Have you any particular definition of cloud computing, or that you feel describe the topic at best?

It is funny that you ask this question because the term cloud computing was coined out by Microsoft and Bill Gates. Since then, Microsoft has thought of them to be the only cloud. People should refer to the cloud

and mean Microsoft. Microsoft Azure is their new platform where they want to have measurable and designed services where you can buy virtual servers and more. Many companies believe cloud computing exist only in Microsoft. We think that the cloud itself is a generic term when you have no servers close to or do not have it outsourced. If the product is outside the house in any way in which several can share a single application while connected, then it is a cloud service.

There are many opinions on what is the right definition on cloud computing, what do you say to that?

There are many who are running services locally and then some services in the cloud and call everything they do in the cloud, but that is no real cloud service. We can talk about authentic and inauthentic cloud services. Authentic cloud computing is when the software is available in the network only. When you can work from "A to Z" on the network regardless of where you are, then there is a cloud service. You should be able to go into an internet cafe in Athens and run Billbox for example.

Do you think this is something that will become bigger on today's market?

Yes I believe that the complex solutions that are often provided by consultants cannot be customized just as a cloud service can. Companies are driven by cost and it makes you always look for better, cheaper alternatives. I think more and more is going through the air, without wires. Cloud computing has just begun and I think it will move more towards that one can choose more and buy here and there of various services and all of it online.

How well can your service connect with different systems that customers have? Is it easy to integrate?

It's a good question! There are indeed more and more demands for products and services that can talk more with each other. The system we provide is relatively easy to connect to customers.

Is there a difference between the integration of a larger user to a small user?

No, it's also an interesting question for the complexity is always the same for a small company like a large company. That makes us wanting to have larger companies. The more bills they have, the better customers they are. However it is not more complex in terms of integration.

The larger companies may set higher requirements for certain type of accounting and real-time update of the project. But today it is effective for us to integrate with customers.

We work with a lot of redundancy, that if something goes down in the ranks, there should be a backup in another place. We have had one serious down-time and then we got a lot of calls to customer service.

How secure is the cloud and do you think it's safer than having it in the house?

For about 6 years ago it was probably safer to have the computers in the house but today it's probably the opposite. It is safer and it is much more professional to have their servers outside the house. Often you have solutions in a company whose business idea is to have high redundancy and also to ensure that safety works. It has good bandwidth, you have the latest software, firewalls, and they replace their servers periodically. Not all companies with local installations have this. In some cases the equipment is in a closet where it can get 39-40 degrees and that is not good at all.

After some investigation with users we have come across three prerequisites that we believe is important, the service should work, be safe and easy to use.

Exactly! And it should be easy to recreate stuff. I agree!

How does the system handle multiple users?

What you are asking about is something called scalability; it has a lot to do with database construction to make more scalable systems. With good scalability you get better stress handling. Each system has a limit though; it can be solved in several ways, either by getting more servers or update the ones you have.

Billbox tasks cannot slow down so far. We expect that in a few years when we have more transactions, we believe it will go a little slower, and therefore, we are already working on a new version to be ready. We cannot wait for the problem to come to us.

It does not have to be that it is slower in performance but it may be other problems such as deadlock. For example, a search was made and you get no response.

Security is a problem in terms of cloud computing, according to many, what have you to say to that?

Today the systems can detect when it is being attacked. Our system has this function and can, when it detects intrusion send ip address so you can spot where the attack was made from. If you look at our traffic on the system, one can see that every minute worldwide, it is at least between 10-100 attacks on our databases and website

When a customer really wants it in the house how do you usually persuade them to cloud computing is the right option?

The first option is to point out the advantage of network and cost for the customer and that it skips the consulting fees and such. Is there any customer who wants it locally and are willing to pay for it, we'll do it, we have that policy. We have had some customers that we have discussed with and they want to keep it in the house. Often we can have a dialogue with the customer, so finally they see that the security actually increased when having it outside the house.

We have not had any local installations since 2006.