Cloud Computing
A step to the future of IT

Master’s thesis within Business Administration
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Abstract

The aim of our research paper is to depict and analyze the new trends and changes happening in the Information Technology industry during the recent years, that are most likely to have a long-lasting impact on how the usage of software technology is evolving. The overall trend that we are noticing in this market is about shifting more and more software applications from local computers to online networks generally known as The Cloud (the concept itself is named Cloud Computing).

The reason for choosing this topic is that, overall, the Information Technology industry is deeply involved in our everyday lives. Therefore, it is important for us as individuals or businesses to be aware of the new trends happening in this field and learn how we can benefit from them.

We will research these trends from the perspective of the providers of Cloud Computing services. We will analyze the challenges of establishing a new market for these services and debate the pros and cons of being the first mover or follower among big and small players. We will also investigate whether there is a dominant design under development.

As means for our analysis, we will research the three main technologies used as a mean to implement the new concept of Cloud Computing, which are Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

One result of our study is that the main players on the Cloud Computing market do not think in terms of national markets or geographical borders about their products. Since they are providing online services, we conclude that it is normal for all the players to see the market as one single entity rather than limiting themselves to geographical areas, which are obviously irrelevant for the Internet market. Another result is that there is confusion among the players when it comes to defining Cloud Computing, Software as a Service and Platform as a Service and the difference between these concepts. We consider as the main reasons for this confusion the fact that the Cloud Computing industry is not yet standardized, and every firm is having its own way of dealing with these new concepts. However, we believe that there is a complex market system under way. All the firms are apparently waiting for a technological standardization or a dominant design, before they will fully adopt and implement this technology. Moreover, most companies we analyzed believe that Cloud Computing will be, one way or another, the future in the Information Technology and Communication industry.
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I Introduction

The way we have been dealing with information technology has changed in the past few years without us even noticing it. Computers or smartphones without an Internet connection have gradually become almost obsolete; most of their value does not come from their internal data content anymore, but from the networks they are connected to (Carr, 2008), generally named The Cloud.

We have also gradually stopped buying software packages stored on physical devices such as CDs or USB sticks and switched to downloading the apps directly from the Internet either for free or for a small fee, by connecting our devices to the Cloud.

If in the nineties the only online application users could use was the email, now users have access to a plethora of online apps, such as word processors, spreadsheets, maps, even tax preparation programs (Carr, 2008) and, more recently, social network apps such as Facebook or Instagram. Especially in the last decade, the impact of Cloud computing in our lives has increased exponentially. Users have been increasingly accessing online software due to the wide variety of applications used to fulfill their daily life needs. Startups or even mature companies have also started switching from physical data storages to renting out virtual storage space on remote servers owned by third-party companies.

We have noted in our research that there is a growing opinion that Cloud Computing is becoming the new paradigm in Information Technology. We can call it the novel way of interaction between humans and the computer world. We feel we are at the beginning of a fresh era in Information Technology, similar to the early 90’s, when the Internet frenzy began.

Being continuously connected to the Cloud is the new paradigm of our lives, since our social activities, means of communications and any other software tools we use on a daily basis are rapidly shifting towards the online environment. This is rapidly becoming a basic need, the same like housing, food or having a job. The authors are writing this research paper using an online word processor, which automatically saves and stores the content in the Cloud, making it almost impossible to lose the work in case our computers crash; it also allows us to edit and share content, although we are a few thousand miles away from each other.

Cloud computing is also having a crucial role in technology innovation; due to the flexibility it provides, it is rapidly becoming a necessity for innovative organisations. Many aspects of our current daily life style would not have been possible, had it not been for the Cloud computing’s contribution to the development of various software technologies. One can take as examples music streaming apps or the maps that guide us when travelling. Or look at the burst of fin-tech startups that are changing the way we do banking. The Cloud computing has helped them to manage their resources well, be cost effective and thus focus on innovation and deliver great products to the society. We almost cannot imagine our lives without these tools anymore.

We therefore strongly believe that there is a need to thoroughly research this technology, as it still is a rather novel concept with a great potential, and so far little study has been done on the subject.
Introduction

Our approach will be to analyze the concept of Cloud computing and look at the emergent Cloud computing market through the eyes of the suppliers of this technology, in order to better understand its content and boundaries, and also the impact on their business.

The thesis will be structured the following way:

• firstly we describe what Cloud Computing is and how it has developed in recent years,
• secondly we create the theoretical framework to describe the theories used to analyze the market. This section is divided into five main chapters:
  o the Abernathy-Utterback model,
  o diffusion,
  o market and strategies,
  o marketing
  o technology and the organization.
• thirdly, the analysis is done on a Case basis describing the view of various companies of the market and their strategies.
• after the case analysis we do a cross analysis to draw conclusions from the different cases and apply the theoretical framework.
• lastly we present our conclusion.
Purpose

2 Purpose

The purpose of this thesis is to analyze the market system for the Cloud Computing industry from the Cloud services suppliers’ perspective and also offer a useful insight into the present and future outlook, while also determining the impact this new concept has on the market. We will analyze the challenges of establishing a new market for these services and debate the pros and cons of being the first mover or follower among big and small players. We will also investigate whether there is a dominant design under development.

Last but not least, we will present ways of marketing Cloud Computing to companies and the driving forces behind the migration of clients to the Cloud, methods of implementations and strategies of gaining revenues for companies developing this technology. Furthermore, we will analyze the benefits end-users are getting from using Cloud Computing instead of buying traditional software.

Initially we intended to focus our research on the Swedish market only, aiming to get a very detailed picture of it; however, this task proved to be more difficult than we initially thought. One of the reasons is that the Cloud Computing is a new market, and since it is established on the Internet technology, it makes more sense to analyze it at a general level rather than trying to localize it. Therefore, we decided to switch our research to the global Cloud Computing market instead.

Moreover, since Cloud Computing is a very wide concept, we will focus our research on two of the most important applications of Cloud Computing, Software as a Service and Platform as a Service, two concepts that we think will develop the most in the coming period. Some attention will also be put on Infrastructure as a Service as it is needed to support Platform as a Service and Software as a Service and cannot be isolated. However, as there is some confusion even by people within the market we will mostly refer just to the Cloud to make it easier for the reader. References to the above three concepts will be made only when relevant for the context.
Research Questions

3 Research Questions

We will focus our thesis on the following questions about the Cloud Computing market (with a focus on Software as a Service and Platform as a Service):

• What is the current status of the Cloud Computing market?
• How big is the level of implementation and acceptance in the market for the Software as a Service and Platform as a Service solutions?
• What are the driving forces for clients switching to Cloud solutions, i.e. what are the benefits/ advantages of Cloud Computing over traditional technologies?
• What strategies do the Cloud companies use to market their products and gain revenues?
• What are the possible shortcomings of Cloud Computing?
• What is the future of the software market?
4 The Main Concepts

4.1 Cloud Computing

Since its conception, Cloud computing has been heralding the shift to an asset-free IT model where users over a network have easy access to highly scalable software, hardware and data resources (Thomas and Redmond, 2009).

Cloud Computing can have different dimensions, depending on the size of the network one refers to. It can be a metaphor, which describes the worldwide Internet. However, a smaller-scale network of servers and connections, such as a company intra-net, or a school computer network, can also be collectively called a Cloud.

Therefore, rather than being a technology or a set of technologies, we believe that Cloud Computing is simply a new concept in the information technology market, which, in order to be realized, is supported by a variety of technologies.

This idea of the Cloud being a concept rather than a technology is also supported by the following definitions below.

According to Salesforce (one of the main providers of this technology), Cloud computing is a kind of software outsourcing, allowing users to access applications remotely, because that piece of software is hosted by an outside party on third-party servers (generally known the “cloud”), not on the users' local computers (2018, Salesforce.com).

Another definition of Cloud Computing is done by a study conducted at UCLA Berkeley University. It states that the Cloud refers to both the applications delivered as Services via Internet (also known as Software as a Service) and the hardware and system software in the datacenters that provide them, which are collectively known as the Cloud. (Armbrust et al., 2009). This can be seen as illustrated in Figure 1 where some of the players in the market are shown in a “Cloud”.

![Figure 1: The Cloud and some players.](image-url)
AWS (Amazon Web Services) goes even further by defining Cloud computing as the possibility to access on-demand computing power, data storage and other IT resources via the internet for a pay-as-you-go pricing scheme (2018, Amazon Web Services).

Cloud Computing is also explained by Fitzgerald (2009), as follows: instead of running the whole traditional process of buying, installing and managing software on one’s own to run applications, one can rent server space from Cloud service providers, such as Microsoft, Amazon, Google and store his/her data there instead. This enables users to manage their data via Internet while paying a fee only for the data processing and storage they effectively use.

Computing at the scale of the Cloud allows users to access supercomputer-level speed and huge storage space on centralized servers. Simply by using a personal computer, a thin client or other access points, like a smart phone, iPhone, BlackBerry or laptop, users can reach into the Cloud for resources, as they need them. Therefore one of the biggest benefits of Cloud Computing is that computer users do not need to store data on their local disks anymore, but on the central servers of the Cloud provider (Internet, the company intranet or the school network).

Cloud Computing encompasses several practices and concepts already existing before this idea itself became popular. Cloud Computing is currently based on three methodologies or technologies that are used as three different delivery platforms for the concept of Cloud Computing: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). These three technologies are not the only possible delivery mechanisms, but at the moment they are the most common ones. However, especially one of the Cloud Computing key components, Software as a Service (SaaS) is starting to have a stronger impact on the way software applications are being developed and how they are marketed to the end-users. In the future, other ways will surely emerge.

4.2 Why Cloud Computing?

Our opinion is that Cloud Computing signifies for nowadays computer users what Internet was for them 20 years ago; we can regard it as an important milestone on the way we interact with computers and information. We also consider as a very important topic analyzing how this interaction will develop in the near future, since the adoption of Cloud services is growing at a fast pace. Cloud Computing will also have a strong impact on the way software applications will be developed in the future and the way of marketing/selling these applications to the Information Technology market. For example, software producers might not sell their applications directly to end-users anymore, but to a company offering Software as a Service to its customers, who can be both companies and private users. Instead of buying the entire package, end-users can only pay a small monthly rate for using the software they actually need.

Schulman (2009), a Gartner Analyst, believes that nowadays owning a data center and software is a liability, unlike the old days. Computer users need to own as little as possible when it comes to software applications. Moreover, it will soon become a standard requirement for large and medium companies “to build their own highly automated private Cloud networks in which all resources can be managed from a single point and assigned to applications or services as needed.” (quoted in Castelluccio, 2009).

Moore (2002) writes that in order to achieve the optimal level of efficiency, companies should only focus on their core activities and outsource all the rest. He adds that “there is
no context task that cannot become someone else’s core task”, i.e. a context operation for one’s business such as delivery services or IT could be the core operation of another company. While most software applications are context tasks to most companies, they represent the core missions of Cloud vendors.

Moore’s point of view can prove very useful when trying to understand the dynamics between traditional software and Cloud applications (Fitzgerald, 2009). Therefore, the translation of Moore’s (2002) message would be that companies should focus their internal software deployment on core tasks only and outsource the rest (the context) of the software to specialized providers, i.e. Cloud vendors. (Fitzgerald, 2009)

Cloud Computing is developing rapidly, having already evolved from its embryonic phase, due to many experiments being conducted to develop new technologies which are helping the Cloud model to extend in the IT market. We will expand further this judgment in the analysis section.

4.3 The Software Market

We will proceed with describing the Traditional Software model versus the new concept of Cloud Computing, with its technological models, Infrastructure, Platform and Software as a Service, from a corporate client perspective.

4.3.1 Traditional software

When we discuss about traditional software, we refer to the complete software applications that the end-user gets in return of paying the license for the right of using these applications.

The pricing of traditional software model (TSM) is limited to the cost of the software application, which is simply an upfront fee for a perpetual user license to use the software. After that, it is the user’s choice to determine the cost of hardware it needs for its internal infrastructure (Fitzgerald, 2009). Fitzgerald (2009) also notes as an additional cost the security software required to protect the valuable information on the local data storage from unauthorized access.

Traditional software applications are highly customizable. However, an increase in the number of users may lead the client company to raise the base cost of the package due to additional need of servers and IT support. Maintenance and application management are the tasks of the customer, who is also the sole responsible for the security protection of its data (Fitzgerald, 2009).

4.3.2 Infrastructure as a Service, Platform as a Service and Software as a Service

These are the most important components of Cloud Computing, as we know it nowadays. Before we proceed to the description of each concept, (with more emphasis on Software as a Service and Platform as a Service), we would like to bring into light the interconnection between the three terms, putting a strong accent on the fact that one concept cannot exist without the other two; they all dependent on each and other one. Moreover, the producers of Infrastructure as a Service have as direct clients the developers of Platform as a Service, that are allowed to deploy their own platforms in the Cloud by using the infrastructures offered by the first ones. Next, Platform as a Service producers have as direct customers
Software as a Service vendors and Software producers, which in turn are the ones that communicate directly with the end-user.

Basically, an end-user accessing the Cloud actually interacts mainly with Software as a Service section; he/she doesn't have direct contact with what is behind Software as a Service.

To make an analogy with a normal personal computer, for better understanding, in the Cloud the Infrastructure as a Service layer relates to the hardware part of the computer. Platform as a Service is the operating system (e.g. Windows or MacOS) that the software runs on. Software as a Service is the ultimate layer where all the applications are run in. More specifically, Software as a Service is the User Interface i.e. what the end-users see, whereas the other layers are invisible to them.

![Figure 2: The layers of the Cloud.](image)

### 4.3.3 Infrastructure as Service (IaaS)

Infrastructure as a Service mainly addresses to Hardware and Software developing client companies. It represents the delivery of computer infrastructure, as a service, to Software developing firms. It offers them the benefit of only renting (outsource) the hardware resources they need, instead of having to purchase expensive servers and other IT equipment, which they might not even use at the maximum capacity.

In our pyramidal structure (Figure 2), Infrastructure as a service is the lowest layer of the Cloud Computing, followed above by Platform as a Service as the next layer, and at the top Software as a Service where software applications are built and run.

According to (Farber, 2006), the IT Industry is moving towards the commoditization of computer services, where the importance of CPU speed or storing data solutions on a ter-
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4.3.4 **Platform as a Service (PaaS)**

The second layer is Platform as a Service that addresses especially to software developers. It offers programmers the needed support for the entire process of building and delivering web applications and software services, directly from the Internet. The developers and users of web applications do not need to download or install software anymore. All these services are provided as an integrated solution over the web.

There has been some confusion for a while between the terms Software and Platform as a Service. When referring to a platform where customers are able to develop and deploy their own applications into the Cloud, many article writers used to associate it with Software as a Service, when actually the term Platform as a Service was more appropriate. Twentyman (2008) notes that the term Platform as a Service has only recently started to be properly used. Also the focus on Platform as a Service started to increase in the last years, as the services became more developed and complex (Hall, 2009, Twentyman, 2008).

While Software as a Service allows customers to use already developed software online in return of a fee or offers a platform where the end-user subscribes to an application that can be accessed directly over the Internet, Platform as a Service offers platforms with programming tools, which allow their direct clients, the software developers, to deploy their own applications directly into the Cloud instead.

In order to charge the users, the Platform as a Service providers measure the usage by CPU load, page views etc. in order to know how much the client have used their resources.

The two leaders in adopting Platform as a Service, Google and Amazon, have already developed relatively mature platforms for Platform as a Service; they included the necessary features in order to be regarded as complete platform applications for the Cloud (Hinchcliffe, 2008). Also Salesforce provide a complete platform instead of just providing online software applications (Hall, 2009). There are already many users of these tools; Salesforce CEO Marc Benioff reports that their customers have already developed 44,000 applications for their platform (Lauchlan, 2008).

In the development process of their Platform as a Service, the companies are using surprisingly open solutions and do not tie the user to their Clouds. They also offer the possibility for the client to move back his data from the Cloud servers to his own local storage, if needed.

Both Google and Amazon are also using their software technologies in order to implement advertisements in the users' applications. The main reason is to generate revenue on their solutions.

The other major players in the industry, IBM, Microsoft, Oracle and SAP have been left behind in the implementation of Platform as a Service or have underdeveloped plans on how to implement their own solutions, according to Hinchcliffe (2008).

4.3.5 **Software as a Service (SaaS)**

The last layer is mainly aimed for the end-users, Software as a Service is a relatively old concept of software deployment, where software applications are hosted on a server, as a
The Main Concepts

service provided to customers through the Internet. Software as a Service also eliminates the need to install and run the applications on the user's computer.

Software as a Service is a simple concept of delivering software applications online; instead of buying complete software packages on CDs or DVDs and installing them on their own computers, users can use the software they need online, via websites where they pay a certain fee per usage. According to McKinsey (2007), rather than paying for the license to install and use a specific software on their terminals, businesses or individuals sign up to use the application hosted by the company that develops and sells the software; this gives buyers more flexibility to switch vendors and less difficulties in software maintenance (McKinsey, 2007).

The Software as a Service model is designed to deliver business applications anytime, anywhere. Software as a Service applications are charged on a subscription basis instead, which includes the cost of the software application, hardware and people required to run it. They are typically a pay-as-you-go model, with costs directly linked to the usage (Fitzgerald, 2009).

Some analysts argue that Software as a Service solutions are gaining ground quickly in the IT market, while Windows, the most widely used Operating System on the market, is gradually losing its dominance. According to MacManus (2008) Microsoft made a mistake of not listening to what the customers need and want and didn’t act accordingly. It is estimated that in 2011 Microsoft will have already lost their majority in market share. This would be a drastic downturn for them and a major change in the software market, as today 70-80% of the business applications are still running on a Windows platform.

On the other hand, Microsoft tries to react to the changes in the software development trends by proposing a possible alternative concept, Software plus Service; it is based on the idea that “Software makes services better and services make software better”. Software plus Services combines local software with Software as a Service, on the assumption that some software components fit better on local computers while others fit better on servers. According to Microsoft, this solution is likely to represent the future of the industry (Microsoft, 2009b).

According to McKinsey (2007), the adoption of Software as a Service has already started several years ago. Companies acquired access for simple human-resource applications such as Customers Resource Management, (e. g. The company Salesforce), which include quite low privacy and data security concerns, and require little customization and integration with other applications. Recently, various specific Software as a Service applications started to gain popularity in large economic areas, such as health care, retail or financial services, as well as in smaller ones such as automotive retailing, law, and real estate.

As applications’ users are growing increasingly comfortable with the new concept of software handling, the next wave of applications is expected to involve more direct transactions between buyers and suppliers, including logistics, and supply chain management. More critical applications for business are likely to be developed, such as hosted environments for software development. Medium-sized and large corporations are already starting to adopt the new type of applications (McKinsey, 2007).

The first two steps in the development of the Cloud software mostly aim to replicate the functionality of traditional applications, which have been sold as packaged software and hosted on the customers' terminals. The next frontier will most likely include new classes
of applications that are actually better suited for online delivery and are able integrate easily with on-premise applications (McKinsey, 2007).

4.4 Advantages over Traditional Software Model

According to Reid (2009), Cloud Computing can save companies a lot of money, it is more efficient, will lower costs and improve resource sharing; there will be less strain on the environment because of the new hardware technology that Software as a Service uses. Due to the environmentally positive effects it is easier for companies to push for these solutions.

One factor that is worth mentioning is the new way of designing software applications, which allows multiple instances of one application to run simultaneously; therefore one application cost can be shared effectively across many companies. Furthermore, the overall drop of cost in bandwidth makes it more affordable for software users to purchase online application services (McKinsey, 2007).

Besides, the frustration given to customers by the traditional cycle of buying, maintaining and updating traditional software is now replaced by the advantage of being able to use the latest version of software online instead (McKinsey, 2007).

Gartner, a global IT research firm, has done a research about the annual cost to own and manage traditionally delivered software applications. The result is that the annual cost can be up to four times higher than the cost of the initial purchase of the software package. Therefore, companies spend in the end more than 75% of their IT budget only on the running and maintenance of the existing software infrastructure (Fitzgerald, 2009).

In the case of Software as a Service, the support, training, infrastructure and security protection are the responsibility of the vendor, in return for the recurring subscription fees. The software provider needs to hire the required support teams and staff available to customers on short notice, plus the necessary capacity to handle any fluctuations in usage or network mishaps, at a continuous, global and secure level (Fitzgerald, 2009).

4.5 Standardization

There is a risk that the Cloud vendors keep their Clouds closed in order to protect their own services and value, there is an initiative called Open Cloud which is currently promoting standardized Cloud Computing platforms, developed by an association called Open Cloud Manifesto. Their aim is to “initiate a conversation that will bring together the emerging Cloud Computing community (both Cloud users and Cloud providers) around a core set of principles.” (Open Cloud Manifesto, 2009). Some of the big names in Cloud Computing that are supporting Open Cloud Manifesto are IBM and Sun Microsystems (Open Cloud Manifesto, 2010). Open Cloud manifesto aim for that Cloud Computing should be open like any other computer technology. Benefits and risks should be figured out and a clear objective needs to be defined for the Cloud; it should be determined how this new technology will impact organizations and how can it be implemented along with proprietary technologies, in order to avoid situations in which customers will be locked-in one solution or have a limited choice. Instead Cloud developers could continuously focus on providing competitive solutions in order to gain new costumers and keep their present costumers (Open Cloud Manifesto, 2009). Another example of standardization efforts is for the security of Cloud Computing called Common Assurance Metric. They aim to show the maturity of the security of data in a constructive way. They want the measurement to be more objective that the current method that are too subjective in nature. Participants are
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Amazon, Google Microsoft and Oracle, among others. They are working together with the European Network and Information Security Agency (Dubash, 2010). These are two initiatives taken to standardize Cloud Computing and there are many other efforts taken to improve the interoperability between providers.

4.6 The Development of Cloud Computing Market

The concept of Cloud Computing in general and Software as a Service in particular began to reach recognition in later 1990’s (Bennett, Layzell, Budgen, Brereton, Macaulay & Munro, 2000). But only recently these terms have started to be widely used for the phenomenon, according to Google trends, 2010. (Figure 3).

The figure shows the search volume index on “Cloud Computing” on Google’s search engine. The data shows that in the recent years form 2007 Cloud Computing has gained massively in popularity.

![Google Trends showing The Search volume index for “Cloud Computing” (Google, 2010).](image)

As the concepts were quite rapidly being introduced in the market by innovators, more and more companies started to recognize the advantages of using the Cloud instead of sticking with the traditional computing systems. A few major players developing a range of Cloud Computing solutions, starting from Software as a Service and extending to Platform and later on Infrastructure as a Service started to make their way into the market. Google, Amazon and Salesforce were among the pioneers of Cloud Computing services.

In recent years the phenomenon grew a lot, however unexpectedly by some, and the market of users of Software as a Service mainly and of the other solutions extended enough to make Cloud Computing as the most innovative and viable solution for developing Internet applications and services. However, the new concept has been mostly adopted by companies rather than end-users. That is why developers of Cloud solutions are still focusing even now on the Business to Business markets which bring the highest revenues rather than trying to penetrate the consumer market, which is still young and unsafe.

The success and financial benefits brought to businesses by the adoption of Software as a Service is clearly shown by a review realized by McKinsey (2007), which acknowledges that companies offering Software as a Service managed to increase their revenues from $295 million in 2002 to $485 million in 2005, an 18 percent increase per year. The McKinsey index of Software as Service companies outperformed the overall software companies’ index (excluding Microsoft) by more than 13 percent from January 2002 to December 2006 (McKinsey, 2007).
5 Theoretical Framework

In the theoretical framework, we shall present the theories that stay at the basis of our research. These theories will also help us explain the general concept of the Cloud and its related features; moreover, based on these theories and the results of our case studies, we will draw our conclusions. The theory section shall be grouped in five main categories, to help us prepare for the analysis of the Cloud Computing market. The five categories are shortly described below.

First, we look at the Abernathy-Utterback model which brings a deeper insight into a better understanding of the innovation concept and the development process of a technology. Then we proceed with the concept of diffusion to understand the adoption of technologies.

Thirdly market concepts and strategies are described, strategies of companies and also market structures are explored and analyzed. In the fourth section we include marketing theory and describe different marketing techniques and also some pricing concepts.

Lastly, we include technology and organization, where we describe how organizations relate to technologies.

5.1 The Abernathy-Utterback model

The Abernathy-Utterback model was originally developed by Utterback and Abernathy in 1974 (Utterback, 1994). The main goal of this model is to categorize the development of a product into different steps or processes and to make it more dynamic. In comparison, previous residing models have been too static and did not take into consideration the changing characteristics of a technology as it develops.

![Figure 4: The Abernathy-Utterback model (Utterback, 1994).](image)

5.1.1 Product innovation

This first process involves the introduction of a good or service on the market; the product is completely new or substantially improved, regarding improvements in technical abilities, functional characteristics and such (Shilling, 2005).

According to Utterback (1994) when a radical product innovation is introduced to the market, it will eventually lead in time to a dominant design. When the market knows what to expect from the new product's features and capabilities, it narrows down the product
innovation into more modest incremental innovation levels. In product innovation, the performance criteria is firstly defined as uncertain; it gradually changes over time to become well-articulated.

5.1.2 Process innovation

The second type is the process innovation, which describes new ways to organize the business, such as new marketing strategies, internal efficiency and new production techniques (Schilling, 2005).

In the formative period of a new product technology, the development processes are still crude and ineffective; they are modeled with the available tools and skilled labor at that time. In the beginning it is the core product that gets the main focus and interest for development (Utterback, 1994).

5.1.3 Change from product to process

During the development of new technologies, organizations go through various transformations. The development focus changes from product innovation to production in larger volumes. The main characteristics of the reorganization process are the structure, goals and rules, which will replace the informal control. The organization becomes more hierarchical and a stronger formalization of processes takes place. Incremental innovations are encouraged more, and major innovations are discouraged (Utterback, 1994).

In line with entrepreneurial theories, an organic structure is necessary in the early phases due to the high uncertainties regarding the market and technology. Production units have to adapt fast to changes and frequently change the responsibilities for the employees. An organic structure is also useful for the management of the company, in order to gather important information for decision-making (Utterback, 1994).

Regarding the development process of the technology, the Abernathy-Utterback model brings three main phases of development: fluid, transitional and specific phase. These phases are ranging from the very uncertain emerging technologies to the fully established mature ones.

5.1.4 Fluid Phase

The fluid phase is a very uncertain phase; it consists of a lot of changes taking place because of the experimentation and rapid development of the technology. The technology of the product is often crude, expensive and unreliable. In this phase the focus is on the product and the process innovation is not pushed further (Utterback, 1994).

The fluid phase is characterized by changes in the product and radical innovations; the development processes are flexible but inefficient; the organization is entrepreneurial, with an organic structure; the product has many different designs and levels of customization. The market in this phase consists of many small firms, with no direct competition. The threats for the technology developers at this phase are the old technologies and the possibility of new entrants (Utterback, 1994).

5.1.5 Transitional Phase

In this phase, a dominant design finally emerges, and the market starts to slowly accept the products. The understanding of the customers’ special needs become a more important fo-
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cus and the development of solutions that fit those needs starts to emerge (Utterback, 1994).

In the transitional phase, there are major process changes and various architectural innovations; the organizations start to have a more formal structure, with task groups; the processes become more rigid, and changes occur in large steps; the products now have less differentiation on the market, due to mass production. The competition between the market players is strong, but it will however decline after the emergence of a dominant design. The threats in this phase for the product developers are the imitators and successful product breakthroughs (Utterback, 1994).

5.1.6 Specific Phase

This is the phase where the technology starts to get harmonized. The different solutions have more similarities than differences. Companies start to focus more on quality and cost factors in order to successfully compete on the market. Specific products are being developed with a high level of efficiency (Utterback, 1994).

The specific phase features a heavy standardization of the product designs; incremental innovations and improvements in quality to the product take place; the organization becomes more traditional and hierarchical; development processes improve in efficiency, are capital intensive and rigid. The market faces a few main players; therefore it can be described as a classic oligopoly. The threats at this phase are new technologies and firms bringing disruptive innovations (Utterback, 1994).

5.2 Diffusion

In this section we will describe the diffusion process and how the adoption of a new technical innovation is adapted by the market.

5.2.1 Adopters Categorization

The diffusion of innovation curve proposed by E. M. Rogers is a model classifying adopters of technology innovations into various categories, according to the reaction these adopters have towards the innovation and the speed with which they accept it. This model is based on the idea that certain individuals are inevitably more open to innovations than others (Shilling, 2005).
Rogers created a normal distribution curve to describe the adopting process (see Figure 5, Adopter categorization). There are five adopter categories: innovators, early adaptors, early majority, late majority and laggards. These categories are put into the normal distribution curve to show how the categories relate to each other. (Rogers, 2003)

Because the adopter categories are based on abstractions of empirical investigations, there are also exceptions to be found for this model. Therefore, the above mentioned categories are ideal types created to make comparison possible (Rogers, 2003).

5.2.1.1 Innovators
The innovators can be seen as gatekeepers for innovative ideas. Because they are the first to use a new innovation, they are the ones taking the big risks. They have to accept that there is a substantial risk that the new innovation fails and therefore have to accept occasional setbacks and accept a high degree of uncertainty as the technology is adopted (Rogers, 2003).

The innovators also need access to financial resources that would help to absorb the possible losses from a failed new innovation. Also, the ability to use complex technical knowledge is required. Innovators often have communication with other innovators even if their location is dispersed. (Rogers, 2003)

5.2.1.2 Early adopters
The early adopters can be seen as the ones that approve a new idea by adopting it. They are the ones who help forming the critical mass, which will adopt a new technology. In contrast to innovators, early adopters have a closer contact to the local social system. Potential adopters look at early adopters in order to get information about the innovation. The early majority is respected and has power in the adoption as their opinion is listened to at a higher degree (Rogers, 2003).
To maintain their regarded position early adopters have to continue to adapt to the new technology. As others look at them as role models they become the center of the communication network (Rogers, 2003).

5.2.1.3 Early majority
The early majority waits for some time to adapt to new innovations. The decision process to adapt to new innovations is longer than the two previous categories. They are important because they link together the early adopters to the later majority (Rogers, 2003).

The early majority is seldom the center in the social networks as the early adopters are quicker to adapt to the new innovations, but they do interact frequently in their social networks (Rogers, 2003).

5.2.1.4 Late majority
The late majority is often pressured by economic and social means to adapt to innovations. They often have relative scarce resources, and this means that uncertainties will have to be removed before adopting. New technology is treated cautiously and is not adapted until a majority has done so (Rogers, 2003).

5.2.2 Laggards
The last category to adapt to the innovation is called laggards. They are often isolated in the social network. The interaction is mostly with others with the same traditional values. They tend to be suspicious to new ideas and are many times taking decisions on the basis of what has been done before. The implementation of innovations comes far behind the awareness; this might be a rational behavior as their access to financial resources are very limited (Rogers, 2003).

5.2.2 Importance of Using the Diffusion of Innovation Model
The Innovation Model helps remembering that trying to introduce a new technology innovation to the market quickly and massively is a mistake. It is advised and logical to try to convince first innovators and early adopters, who will themselves, later on, convince the other groups of individuals in turn. The percentages can be used as a first draft to estimate the target groups for communication purposes (Shilling, 2005).

5.2.3 The take-off
When the new customers start to become focused on value rather than purchasing price or are much more interested in the ancillary attributes of the offering, then it is likely that the product or service has reached the take-off stage (Shane, 2009). When the market is about to take off, the customers begin to shift from innovators and early adopters towards the early majority. One can also look at the difference between the new customers and the current ones. A product is about to reach the mass market when it has reached the take-off stage. If you look at the past demand for the product and if the demand for the product is accelerating – the take-off stage has been reached.

There are ways to try to get the product to take off earlier if marketing is used a tool to promote it. Testimonials from early adopters can for example be used in this case. A marketing message that is based on value proposition will increase the probability that the product or service will take-off. Changes to improve the offering and the lowering of the price will produce a more affordable offer that will likely meet the customers’ demand and increase the odds for a take-off (Shane, 2009).
Theoretical Framework

5.2.4 Technology Diffusion S-curve

The distribution of innovators (those who discover new innovations from other sources than previous adopters) and imitators (those who learn about innovations from previous adopters) affect the way the market picks up on the new product and the shape of the diffusion curve. As explained later on, diffusion follows an s-curve when there are not that many innovators but many imitators. In the beginning of a new technology there are just a few innovators that use it and the diffusion is slow. When the adopters start to adapt the new technology, the discussion accelerates. When the market is saturated the discussion slows down (Shane, 2009).

The s-curve for the diffusion is different from the one for technology and adoption. The diffusion curve is not always s-shaped. If there are many innovators and few imitators the curve becomes convex; it also changes shape according to the case when there are potential adopters that are not closely connected and previous adaptors have little influence on the decisions of the ones who come in later (Shane, 2009).

Technology diffusion S-curves are obtained by plotting the cumulative number of adopters of the technology against time. The adoption process is generally slow in the beginning, because the technology is still unfamiliar to the market, then it accelerates as the technology is better understood and used by the market, and eventually the market becomes saturated, therefore the rate of new adoptions will decline (Shilling, 2005).

![S-Curve of Cumulative Adopters](image)

Figure 6: Technology Diffusion S-curve (Shane, 2009).

5.2.5 Technology Performance S-curve

Technology S-Curves are developed according to the values of rate at which the technology's performance improves, on one axis, and on the other the rate at which the technology is adopted in the market place. The S-Curve of a technology innovation shows a slow ini-
Theoretical Framework

In the early stages, performance improvement is slow because the fundamentals of the innovation are poorly understood. Then, as firms and overall market begin to understand the technology better, improvement begins to accelerate. However, at some point, the technology will reach its inherent limits, the cost of each marginal improvement increases, returns to effort start to diminish and the s-curve flattens (Shilling, 2005).

Sometimes, technologies do not have the opportunity to reach their limits, because they may be rendered by new, discontinuous technologies – which are new innovations fulfilling the same market need, but on a completely different knowledge base. If the improvement rate of the discontinuous technology is faster than the previous incumbent technology, i.e. the s-curve is steeper, then it will likely be adopted instead of the former one (Shilling, 2005).

5.2.6 Usage of S-Curves

Managers can use S-curves model as a tool for predicting when a technology will reach its limits and as indicator for when or whether the firm should move to a new, different technology. Firms can use data extracted from the investment and performance of their own technologies or from the overall industry investment in a technology and the average performance of multiple producers (Shilling, 2005).

5.3 Market and Strategies

It is vital for a company to develop a clear and profitable strategy, and to base it on its own abilities and competencies against the opportunities given by the market. We will present six different strategies that can be used to analyze the market in which a company intends to penetrate or expand. According to the type of market in which the firm wants to enter, a certain marketing strategy shall be adopted.

5.3.1 The Product-Market Matrix

Igor Ansoff created the Product-Market Matrix in 1968. It is a simple and logical model for growth. The matrix consists of four strategies: market penetration, product development, market development and diversification.

Each of the strategies is located in existing or new markets on one axis and on the other axis there are either existing or new product/services (Figure 7) (Burns, 2005).
5.3.1.1 Market penetration

Market penetration is about selling more to existing customers. The company should have a strong relation to their customers in order succeed with this strategy. In order to get strong market dominance, the market penetration strategy is an important part, especially when the market is mature, the growth is stagnating, as well the profits. In this case, an entrepreneurial firm should look at some of the other quadrants of the matrix. One solution for the company to continue to earn profits is to consolidate its business (Burns, 2005).

5.3.1.2 Market development

Market development is an optimal strategy when the company is extending its products/services offerings into new markets. It is important from a growth strategy point of view, as the company has to adopt the market development solution at some point, in order to maintain its growth rate. This can be done if the product/services offerings are extended to new segments of the market or even net geographical areas (Burns, 2005).

One of the most important reasons for market development is the economy of scale in production. This is especially important as a product starts to become more and more a commodity. Another reason to apply this strategy is when the competence lies within the product itself, such as in the case of the automobile industry. It would take too much effort to develop a new product from scratch. A third reason is simply that the current market is becoming saturated; therefore, the company needs to extend into new markets (Burns, 2005).

5.3.1.3 Product development

Product/service development might be done in several ways. Completely novel products can be introduced into the market as the company sees the customers’ need for them and spots an opportunity. On the other hand, the company can also apply small incremental improvements to an existing product. Copying another company’s product and develop its own competing offer can also be an option. (Burns, 2005)
5.3.1.4 **Diversification**

Introducing new products into new markets is called diversification. This is often done to spread the risk of a firm. As the firm enters new territories both market- and product-wise, its situation becomes however highly uncertain; this is a high-risk strategy (Burns, 2005).

Customer-centered firms have an advantage when developing new products. As they work close to their customers, these players know what they actually need to do and get the right input for new products. Communication is also an important matter in favor for the customer-centered firms when they are marketing their products to the market. (Burns, 2005)

5.3.2 **Radicalness**

When it comes to the radicalness of innovation, there are considered to be two types as well: radical and incremental innovation. A radical innovation is a very new and different innovation from prior solutions. A radical innovation would be something new to the world and exceptionally different from existing products and processes. An incremental innovation is not particularly new or exceptional, and it makes a relatively minor change from existing practices. The radicalness of innovation is defined in terms of risk, since it embodies new knowledge, producers and consumers will have different reactions when it comes to the actual implementation of the innovation, according to their experience and familiarity with the innovation, and their judgment of its usefulness or reliability (Schilling, 2005).

There is some evidence that incumbents will wait to introduce their innovation as long as possible. This approach might exist because of the fear that other will cannibalize on their innovation. They might wait as long as to when another firm introduce a radical innovation, then they introduce their own innovation to the market. These firms do not seek to be the first to enter the market but when new technology enters the market they are fast to introduce their own equivalent products (Chandy and Tellis, 2000).

Moreover, an innovation can be considered competence enhancing or competence destroying from the perspective of a particular firm if it builds or not on the firm’s existing knowledge base. (Schilling, 2005).

5.3.3 **Dominant Design**

A dominant design is a single product or process architecture that dominates a product category; it is a “de facto” standard for the industry. Markets naturally focus on a single dominant design rather than supporting a variety of technological options. The main reason for this would be that many industries exhibit increasing returns to adoption, i.e. the more a technology is adopted, the more valuable it becomes (Schilling, 2005).

5.3.4 **Increasing returns for a new technology**

Schilling (2005) mentions two primary sources of increasing returns for a technology, once users adopt it. These would be learning effects and network externalities.

5.3.4.1 **Learning Effects**

Schilling (2005) suggests that the more a technology is used, the more it will develop and the more effective and efficient it will become. Once the number of customers adopting this technology increases, it will start generating more sales revenues, which can be reinvested in further development and refining of technology. Technology producers will accumulate more experience with the technology, thus they will be able to use it more pro-
ductively and improve the implementation process of the technology. The learning curve will have a positive impact on the costs and productivity and allow vendors to reduce input costs and increase output performance.

5.3.4.2 Network Externalities

Network externalities are positive consumption externalities that create value when a technology gets widespread. Network externalities can be described with the classic case of VHS and Beta in the eighties. There were two competing video cassette formats that are incompatible with each other. VHS eventually emerged as the winner in this battle, due to a larger selection of prerecorded cassettes and also a larger selection of rental services available to the consumer. Further due to the market penetration owners of VHS equipment could exchange cassettes with each other to a larger extent than the beta owners. Network externals are important to many industries. Other examples where network externals are important are in the railroad and telephone industry (Katz and Shapiro, 1986).

5.3.5 Product Differentiation

Differentiation can be a product of quality, performance, technology, function etc. The differentiation can derive from innovation; however, it can also bring something new or different without necessarily being innovative. Differentiation can come in many forms, such as new distribution channels (telephones and Internet), or design (ex. Bang & Olufsen) (Burns, 2005).

To leverage on the differentiation, the firms need to have a clear and efficient branding strategy. The brand should convey what the product is about. For example, BMW’s brand is sending out messages about quality. Not all brands work as a powerful transmitter; they are just a logo that shows what the company sells, such as Shell. The brand should be an important part of the marketing strategy for the product and services, in the case of a homogenous market. A powerful brand can also make companies move up the customer loyalty ladder faster (Burns, 2005).

In order to keep the differentiation for as long as it needs in order to be patented, branding material can be copyrighted and design registered. Also branding can act as a barrier to entry. The bigger the market is, the harder it is to protect the differentiation of the company from competitors (Burns, 2005).

5.3.6 Core competence

Core competences increases when they are used in contrast to tangible resources with are depleted. A core competence is often a combination of skill and technical knowledge. With the core competence in a company they can stay competitive in their business. It can also help them diversify into new businesses. (Yuki, 2006)

When trying to penetrate new markets a firm should try to stick to its core competences to a high degree as possible. The further the company deviates from its core competences the harder it will be to penetrate the new market. Even though the core competences might not seem directly relevant they can often be leveraged when entering a market. Even though it might not be a distinctive advantage a firm can often use economies of scale and its existing distribution channels to gain market share (Burns, 2005).
5.4 Marketing

In this section we introduce some marketing strategies relevant for our research about how the Cloud Computing developers will market their products.

5.4.1 Direct Marketing

Direct marketing is any form of marketing targeted on individuals rather than focused on mass communication. With its ability to store and manipulate large databases, direct marketing makes it possible for the seller to make immediate contact with the prospective customer. The best known form of direct marketing is direct mail, a low-cost strategy which is also known as viral marketing. More persons who have acquired something new and they are happy with the product are keen to tell their friends about it. Their contagious enthusiasm is the basis of viral marketing (Baker, 2006).

5.4.2 Viral Marketing

The internet has made the word of mouth a powerful tool. It can be used by marketers to better understand the consumer sentiment, and also to influence it, i.e. trying to manipulate consumers’ opinion. Viral marketing describes any strategy that encourages individuals to deliver a marketing message to others. The most well-known form is an email from a happy customer to other prospective ones. The happy customers will include a link or an advertisement in an email which they forward to other people in their mailing list. This way they pass on favorable information. Viral marketing over the internet can be referred to as word of mouth, creating a buzz or network marketing.

5.4.3 Guerilla Marketing

Guerilla Marketing is a concept describing unconventional marketing techniques which are intended to get maximum results by using minimal resources. These techniques rely more on time, energy and imagination rather than a big marketing budget. The main purpose of a guerilla marketing strategy is to generate a buzz and spread virally. It fits perfectly with small companies or startups with low advertising budgets. Recently, such strategies have started to be adopted by larger companies as well (Kotler, 1999).

5.4.4 Vertical Marketing

In conventional marketing systems, producers, wholesalers and retailers form separate business entities trying to maximize their own profits. When one of the system members is maximizing its profits at the expense of the others, problems can arise. Therefore, more and more companies nowadays are forming vertical market systems. A vertical marketing system is opposite to the conventional system, i.e. all the main members of the chain work together as a unified group to meet customer needs (Kotler, 1999).

5.4.5 Horizontal Marketing

Unlike vertical marketing, horizontal marketing occurs at the same level of a distribution channel where members join together in strategic alliances or joint ventures with the purpose of exploiting a new market opportunity. The members of this alliance can combine resources to make the most out of the available opportunity (Kotler, 1999).
Theoretical Framework

5.4.6 Price determinants

Baker (2006) divides price determinants in two categories: external and internal. Regarding external ones, a major factor influencing the level of the price is the market structure. In a monopolistic or oligopolistic market, the dominant firm or the industry leader is also the price-maker. All the other companies are mainly following the price set up by the main player, “frequently exhibiting price rigidity owing to the price leadership of a dominant firm” (Baker, 2006, p. 438)

Another external determinant is the elasticity of price. In theory, elasticity measures the reaction of demand to changes in price. It depends on the importance of the product in the scale of preferences of the consumer, by the disposable income and the existence of product substitutes.

A third determinant would be policies determined by the government regarding price maintenance or minimum performance standards for the industry's products.

Internal price determinants include the number of competitors, the stage of consumer acceptance of the product, degree of potential market segmentation, the degree of physical difference between the seller’s product and those of other companies, the opportunities for variation in the product-service bundle (Baker, 2006).

5.4.7 Pricing Issues

Of major interest for the level of pricing is the importance of price in influencing the prospective buyer’s perception regarding the quality of the offering. Simon (1989) quoted by mentions a few conditions based upon which the link price-quality is determined (cited in Baker, 2006):

- Whether brand names play an important role or not in the decision making of the customer
- Customers have little or no experience about the product
- Price itself is an important determinant for the buying decision
- The complexity of the purchase task
- The level of buyer’s confidence.

5.4.8 Pricing Strategies

Baker (2006) suggests two strategies for giving the right price of the product to the customers. First strategy, skimming, is based on a high price approach “aimed at skimming the cream off the market” (Baker, 2006, p.451); however, such strategy is optimal for mature markets which are segmented on the basis of quality, design features and such. Skimming is also attractive for a company offering a novel unique product which the company wants to initially sell for a high price in order to give a high-quality feeling to the customers. Later the price can be lowered, but it is important not to reduce it too quickly to avoid ill will (Baker, 2006).

The second strategy is a penetration strategy based on a low-price level, aimed at rapid gaining of market share. This allows for fast growth in sales in spite of low unit contribution margin and also reduces the risk of failure. (Baker, 2006)
Theoretical Framework

5.5 Technology and Organizations

Lastly, we describe how organizations use technology from different perspectives and how it affects the organizations.

5.5.1 The Interaction of Sellers and Buyers on the Market of a New Technology

Darr and Talmud (2003) argue that in emergent technologies markets buyers and sellers lack a common image about the usage of the product being developed, therefore in order to reach a consent they need to communicate contextual knowledge. In emergent markets, knowledge is considered to be contextual, as opposed to articulated knowledge in a mass market. Therefore, the two parties must engage in an intense technological dialogue, which might be difficult in the beginning. The reason might be that the producers of the technology have an intimate knowledge of their product, which they are reluctant to share with prospective.

Buyers and sellers in emergent technologies markets have different interpretations about the design and use of the product to be sold. Therefore, to complete a sale, buyers and sellers must first arrive at a similar image of the usage of the product. The successful completion of a sales transaction in such markets mainly depends on the transfer of the contextual knowledge in the customization process; however, contextual knowledge is embedded locally, thus it cannot be easily articulated or understood outside a specific context (Darr and Talmud, 2003).

Additionally, product application in emergent technologies markets is considered to have an interpretive flexibility. Lead users, which are mainly large buyers, are the real major innovators in the high-tech markets, since they use the innovative products and technologies in a totally different way than it was originally developed by the producer (Darr and Talmud, 2003).

5.5.2 Software and Organizations

Software has a big impact on the organization in which it is implemented and used. It defines the way people interact in the organization and also how the information is used, what they communicate about, what skills they need etc. Often the software itself is a major innovation but it might also ignite other innovations to the customers as it creates more capabilities, which the customer can successfully use to further create new innovations based on the features of the software. With the right software that fits its needs, the company will be able to further integrate, eliminate or merge steps in the innovation process. The software can also lower the innovation costs, shorten design cycles and increase the value of the offering to customers (Quinn, Baruch and Zien, 1997).

Software is also helping the diffusion process when companies have tested a new product within a market and want to expand into that market. Introduction of new products to other markets can be done more consistently, with higher accuracy and a higher reliability of performance. This is most common in finance services, fast food and maintenance services (Quinn, et al., 1997).
5.6 Technology Decisions

We would like to proceed with explaining shortly how companies make decisions about which technology to adopt and what are the key issues they need to take into consideration when adopting a new technology.

The steps towards understanding the decisions that a business firm must take about its technologies are related to the three major tasks faced by the company concerning technology. The company can acquire the technology needed for its operations and its offerings; further on it has to fully exploit the acquired technology in the company own offerings or by other means; in the end it is important for the company to be able to manage these two processes effectively in a complex organization (Ford, Gadde, Håkansson and Snehota, 2006).

When it comes to acquiring a new technology, the company has a few choices. It can either make the technology by itself or buy the technology from a company developing it. The buying process can be done in a number of ways. First the company can buy the technology by acquiring a license. The risk here is about acquiring obsolete techs that are also available to competitors. A second choice would be to buy a company that already has that technology, but it might be too expensive. A third option is to commission a contract-research company to develop a technology for it (Jones, Lanctot & Teegen, 2000, Ford et al., 2006). This solution can be fast but expensive; moreover, the company doesn’t gain the ability to develop future generations of the technology by itself. A final solution would be to hire staff from a company that has skills and technology that it wants. A joint venture is useful where the company has some, but not all the skills or finance available for a development (Ford et al., 2006).

We would also like to note that, according to Ford et al., (2006) there are three types of technologies in a company, which are of different importance to the company’s customers. First of all, there are the basic technologies. The company depends on them and without which them the firm would not be able to operate. Next, Ford et al. (2006), mentions the distinctive technologies that give the supplier the required competitive advantage. For example, Volvo has a distinctive technology on safety engineering. Last, the external technologies are also worth mentioning. Very often a customer will develop a relationship with a supplier rather than develop the technology itself. The companies prefer the solution of externalizing technologies because they are trying to limit the cost of technologies development and managerial activity (Ford et al., 2006). Companies are too often competing on basic technologies that will only drive the cost of the industry. Companies need to understand what can lead to a competitive advantage. This can lead to a company that invested in an IT-project when a collective investment would have been enough. A good example of this is when ATMs (automated teller machine) were introduced in the UK and that this would create a Competitive advantage. It soon turned out that this was an industry wide cost. Banks began to cooperate to drive the costs down instead of taking the costs alone (Brady, Cameron, Targett & Beaumont, 1992).

We would like to go even deeper into the buying process of a new technology by a company, and use the description given by Shilling (2005) about the various issues involved in a technology buying process, equally important for the providers and the companies, which are buying the technology.

Firstly, the sellers should keep in mind that technology buyers are affected in their buying process by their previous experience with different suppliers and brands and will consider
any possible future purchases of similar products. Moreover, a number of people are involved in the business purchase, from different levels in the buying company’s hierarchy and from a number of functional areas – operations, finance, marketing or purchasing. Each function has its own concerns about a particular purchase: operations managers are concerned how reliable the purchase will be in use; marketing department about how the purchase will add to the performance of the company’s own offerings; finance department about how expensive the purchase will be (Ford et al., 2006).

The duration of a purchasing process is also important to consider. It depends on the complexity of customer’s requirements, the importance of the value of the purchase for the customer, the level of his knowledge and the help and support the supplier provides. Often it is a supplier that leads a customer to recognize the problem and address it. Solutions of many problems are found within existing customer-supplier relationships (Ford et al., 2006).

The technology provider should not forget that prospective buyers are not interested in products themselves. They are only interested in what products will actually do for them and the problems that they will solve. Companies are increasingly not acquiring many of the technologies they need for their businesses. They tend to have fewer internal technologies and rely more on complex relationships with suppliers, i.e. who will effectively manage the techs on behalf of their clients (Ford et al., 2006).

5.7 Productivity Paradox

First of all, we would like to define the productivity concept, as the total amount of output per unit size of input. The Productivity Paradox states that there is a discrepancy between the level of investment input in information technology and the amount of output, according to Turban, Leidner, McLean and Wetherbe (2008). Moreover, there is an additional problem that investments in Information Technology incur high expenses, due to the high prices paid for the proprietary software solutions or technologies.

According to the Productivity Paradox theory, it is believed that investments and development in IT industry do not bring any visible productivity results in the business world, but instead they increase the costs for running the business. It is actually a contrast with the general belief that the information and communication technologies sustain the flow of information among actors in the value chain and promote efficiency of resource utilization.

Beynon-Davies (2002) propose productivity paradox to be viewed as a condition or state which is characterized by increasing level of IT penetration (diffusion) but with no or little influence over the total productivity of the business.

However, David (1990) believes that investments in information technology are indeed productive, but the productivity will be visible on the long term instead.

The Productivity Paradox has also been explained by Brynjolfsson (1998), who researched the productivity issue. His conclusions are as follows:

- Input and output ratios in IT sector are difficult to measure;
- It is difficult to delimit profits and revenues sources; therefore, trying to measure the performance of IT productivity based on financial achievements could lead to statistical errors, because the benefits of investments in IT have a more non-financial impact on the business.
Theoretical Framework

- The implementation of new technology requires devoting time to learning and training the personnel and adjusting the flow of the business operations to the new technology.
6 Research Method

Any research can be conducted in five different ways, either by case studying, surveying, experimenting or analyzing archives or historical data. (Yin, 2003)

Our research is aimed to analyze the Cloud Computing market system and look at the trends from the service providers' point of view. We will also debate in our research the benefits and disadvantages of the Cloud over the traditional information technology and determine the future development of the Cloud market, whether or not it will become the new paradigm in the Information Technology. We will also try to establish if there is a dominant design on the way.

Last but not least, the research will also focus on the challenges of establishing the market for the Cloud services and the pros and cons of being the first mover versus being a follower.

The chosen approach in our research is based on Yin's advice that considers that a research similar to ours should be conducted based on two research methods: analysis of historical data and study of market cases. (Yin, 2003)

The research based on historical data was mostly conducted by using information coming from academic and non-academic articles, about topics related to Cloud Computing. Combining articles about the IT market with the appropriate theory regarding innovation of technology, buyer and seller behavior, and strategies for market expansion allowed us to build up a comprehensive general view of the Cloud Computing market, understand its current status and the path it will most likely follow in the future.

Regarding the second method of our research, we have chosen to conduct case studies of the major providers of the Cloud Computing technology, as well as complementing with some smaller actors in the market, in order to get a clearer picture from a professional perspective.

Deciding upon a sample list of companies as our research subjects has been a straightforward task. Due to geographical travel limitations and also due to the fact that most important players in the Cloud Computing market are already present in Sweden, we have decided to narrow down the geographical sampling area to Sweden.

As per criteria of selection, the fact that Cloud Computing is a relatively novel concept has eased our task of creating a sample list of companies to analyze, because the Cloud Computing players are rather few. We searched for companies located in Sweden, which are currently offering or on the way to offer Cloud related services in the near future. The selected companies are or intend to penetrate the Cloud Computing market in the near-future.

We have therefore narrowed down our research sampling to Microsoft, Google, Salesforce, Sun Microsystems, IBM, Amazon Web Services, IS Tools, Apple, Capgemini, VMware, Modul I, Icloud and a major Telecom Company which wished to remain private.

The sampling list of companies, together with their Cloud service and research method are shown in the table below:
We gained access to these companies by directly contacting their offices in Stockholm and interviewing their representatives. We have also participated at a special event related to IT and the Cloud: Cloud Computing Conference in Stockholm on June 2nd, 2009. There we had the chance to gather supplementary data for our research. At the conference we attended seminars from companies such as Amazon, Capgemini, Google, Salesforce, VMware, IBM and Modul I to get their view of the market.

We have also picked-up important data from the presentation material offered by one of the Swedish start-ups in Cloud Computing, iCloud, which are currently providing a Cloud Computing Service in Sweden.

As per method of collecting data, our main approach was a direct one, getting in touch with each company, explaining what our research is about and the goals we would like to achieve with it.

Aside of this, we have also interviewed several people who have interest in Cloud Computing. Both authors of this thesis have many friends working in the IT industry and having good knowledge about this subject. They helped us better understand the main concepts.

These interviews were conducted in a structured way shown in the interview guide (see Appendix I). The guide is divided into four sections that cover the current state of the market, strategy, future and financial aspects of Cloud Computing.

During our research we have also stumbled upon some legal matters connected to Cloud Computing. Therefore, we have attended a seminar by a representative from the Swedish Civil Contingencies Agency, during the Cloud Computing Conference in Stockholm, to clear out some legal consequences and possible problems with Cloud Computing. To further dig into the legal matters of Cloud Computing we have also conducted an additional
Research Method

interview with Jakob Heidbrink, Assistant Professor in Law at Jönköping International Business School.

After we have gathered all the data from the interviews and other means, we divided the different companies and made a case study for each company and summarized their view on the market and strategic aspects. After this, we conducted the analysis putting all the cases together to get a view of the current state of the market and strategies. We also touched on the shortcomings, problems and challenges of Cloud Computing and how the technology might develop in the future.

The research is done from a Swedish perspective due to practical reasons and limitations in time and resources, but Cloud Computing is definitely a global phenomenon and cannot be limited to the Swedish market. All the companies we have interviewed are international, therefore, even if we have accessed their headquarters in Sweden, the view they have given us upon the Cloud market is surely at an international level. Cloud Computing requires complex technological solutions and a high level of demand is needed to have a market big enough to bring high returns on the investments.
Case Studies of the Main Market Players

7 Case Studies of the Main Market Players

There are already many important players in the Cloud Computing market, who have a “word to say” and are worth analyzing in this thesis. We will proceed by describing their view over the entire market, field of activity and market strategy, while putting a stronger focus on the ones we find to be most innovative and hence relevant for our research. Therefore, we have organized them in two categories: Strategic Players – the ones most relevant for the market - and Smaller Players - less relevant participants of the market. The relevance to the market is the most important factor, hence there are some cases in which otherwise big companies fall into the smaller-player category in this research, based on their relevance in the Cloud Computing market.

As strategic players we have chosen Microsoft, Google, Salesforce, Amazon, Sun Microsystems and IBM, because they are well-known global companies, considered by us to have a major influence in the development of the Cloud Computing technology and market.

We have categorized the others (the telecom company, Capgemini, VMware Apple, Modul1, IS Tools and iCloud) as smaller players as they are not so relevant and less influential to the Cloud Computing market today.

At the end of this section, we have also included an interview with Jakob Heidbrink, an Assistant Professor of Law at Jönköping International Business School, about the implications of storing private data or important company information on third party servers.

7.1 Microsoft

7.1.1 Microsoft’s view on the Market

Regarding Software as a Service, it is interesting to note the fact that Microsoft regards it in a special way. Microsoft considers it to be a much more mature product than Platform as a Service. The market for Software as a Service is currently taking off stronger, because there has been a drastic increase of users recently. However, according to Microsoft the market is not ready to fully adapt to either Software as a Service or Platform as a Service yet. The main problems that need to be solved before the whole market would adopt these solutions are portability and an easy way to log into the Cloud services. Especially for customers such as financial firms where the security is vital, Cloud Computing solutions are not yet an option.

Microsoft believes that the standardization of Cloud Computing might begin in one or two years but for now companies are limiting themselves to innovating instead of trying to create a standard. As for the future, the Cloud solutions developers should take into serious consideration the security aspect. If the attention does not shift more seriously to security in the future, this might be a setback to Cloud Computing.

7.1.2 Microsoft’s Strategy

As its main strategy, Microsoft mostly uses its own technology and know-how when creating its Cloud solutions; they have decided to proceed with their own proprietary technologies, such as Office Exchange and their development framework .NET, instead of developing completely new solutions for the Cloud. Microsoft has relied heavily on their software as long as they have existed. They are also supporting some standards such as Java, devel-
opened by Sun Microsystems, but they are mostly focusing on their own .NET solution. Their Java development kit is developed by one of their partners, Schakra Inc. (Microsoft, 2010b). This shows that actually not all the technology is developed by Microsoft in-house, but some is also licensed to third parties. Moreover, on the Cloud market, Microsoft can leverage its existing distribution channels in order to gain more market share.

Microsoft’s strongest products are the well-known Windows and their Office suite as well as their communication solutions exchange. They have also proposed a novel solution called Software plus Service where the users can install software partly on their computers and partly run on a server.

Their approach to Software as a Service is intended to actually extend their current offering more into the new market of Cloud Computing, in order to satisfy the customers’ demand for online software.

Regarding Platform as a Service, Microsoft’s own solution, Azure, offers the customers the capability to extend their current applications to take advantage of their Cloud solution. They are also extending their current proprietary platform, .Net for Azure, as well as offering some development for Software standards. Even tough they are also offering other development alternatives, Microsoft are pushing for the user to use mostly the .Net development framework (Microsoft, 2010a).

### 7.1.3 BPOS

BPOS is Microsoft Software as a Service solution. It’s not fully Software as a Service but called Software plus Service. This means that some of the software that is better run on local computers is done so and the other way around, parts that are better run on servers are put on servers. (Microsoft, 2009a)

The information can be accesses form programs in the office suite, a browser, and Mobile devices. The online software is always up to date to a predictable cost. The servers do not have to be updated as it’s provided in the service. For the security its encrypted for the customer to maintain the comicality. Datacenters are located over the world, not in every country though, for example in Europe there are two data centers in Ireland and the Netherlands. The solution is based around the latest version of Office (2007). So the solution is not fully subscription based, as the user has to buy and install the software on their computers that have to run the Windows operating system. Its priced at 132 SEK or $15 a month (Microsoft, 2008a).

### 7.1.4 Azure

Azure is Microsoft’s Platform as a Service solution. It’s a solution where you can build applications for the Cloud, crate hybrid solutions where some can be on-premises and some on their servers. The solutions can be run on both conceded devices and on ordinary PCs. Microsoft support several open standards for development as well as their own .NET development platform. Azure is under development and soon more programming languages will be supported. The platform is designed so be available; scalable to fit the user’s needs and supports a pay-as-you-go pricing model (Microsoft, 2008b).
7.2 Google

7.2.1 Google's view on the Market

Although Google considers security to be one of the main issues regarding implementation of Cloud technologies, they believe that, over time, vendors will earn the trust of their customers for safely holding their data on their servers.

7.2.2 Google's Strategy

Google is known for anything that has to do with the Web world, especially search and emailing services etc. Google tends to focus mostly on their core competences and offer their core services to clients, in two main areas: search engine and web applications.

Google is one of the pioneers currently experimenting and developing Cloud applications already supplied to customers. Their target market is not yet clearly established; they are currently trying to find a common ground in the development of Cloud applications.

The main slice of their investment is done on the hardware side, since this requires a much higher financial and technological input, i.e. the establishment of powerful servers in service centrals with high storage capabilities and advanced cooling power, in order to meet high data transfer requirements. Software on the other hand is not so costly to develop, since it can be created in smaller teams.

With google.com and Google Maps that can be regarded as Cloud services, according to Google, their share of the newly developed Cloud market is constantly increasing. Other Cloud services have been integrated with others, in order to enhance the value they provide to the end-users. For example, translate.google.com is integrated with Google Talk, which is Google Instant Messaging solution. Therefore, Google Talk is able to translate in real time what one is writing, so that his/her conversation partner will receive the answer in his own language. This is a great example where innovation in IT is driven by the Cloud.

Google doesn’t focus on Infrastructure as a Service, which has a high degree of customization and is currently offered by other players, such as Amazon and VMWare. Instead, they provide a very new solution for Platform as a Service, called App Engine – a platform that allows businesses to run applications with built-in technologies (Python or Java), although the level customizing is not that high. This App Engine contains both Infrastructure and Platform as a Service features, allowing businesses to develop their own applications and deploy them themselves. The service is free until a certain percentage of CPU and storage space usage.

In 2009 over 1 million companies are running Google’s Cloud Apps; there is a rate of 3000 new domain signups each day on Google Apps. By moving to the Google Cloud, there is a lot of cost and space saving. For example Gmail’s cost is one third of the cost of traditional in-premise email solutions.

They also provide security functions for e-mail. E-mails are sent through a Cloud Computing service. All the spam and viruses are removed from the mails before they are delivered. Google also provide e-mail archiving services and encryption of data transactions with https.

When it comes to data safety, Google understands the worries customers are having about handing over personal data to a server provider. Since they are in this issue for the long run, their aim is to constantly build trust with their clients. Google admits the fact that
there is always a certain amount of data that a business doesn't want to share with anyone else, but this accounts for 10-15% of the entire volume of data. The rest can be taken care of by the Cloud companies.

Google protects data in a number of different ways. They mirror every transfer or data exchange and in the case of an error occurring, the users are routed to another data center. They also have external auditors into the data centers to maintain the security level they want to keep. Google affirms that they are just as secure as on-premise storing solutions.

The company is also environmental friendly oriented when developing their solutions, trying to save energy as much as possible and improve the efficiency of their data server's consumption.

They also collaborates with Salesforce, having their instant messaging and document handling services integrated into Salesforce Cloud. The implementation was done relatively fast, taking only 9 months to develop the interoperability between the two Clouds.

Google outsources as an Open Source parts of its software developments processes, intending to use open standards when it is feasible to do so; otherwise, they invent their own solutions when there is no appropriate one already being developed.

7.2.3 Google's Platform as a Service

Google has its own Platform as a Service solution that they are offering through their customers. It’s still in beta so it is still developing and not ready to be used by the end customers. It can be tried for free, but if you get pass a limit on CPU usage and bandwidth you have to pay to continue to use it. It will be possible to develop scalable solutions to be used buy one user to a million in a easy way without encounter any infrastructure problems (Google, 2009b).

7.2.4 Google's Software as a Service

Google Docs is Google’s solution for office application. There are application, for word processing, spreadsheets and presentations. You can edit the documents and also share them with others. The documents are stored on Google’s servers; there is also an option to edit documents offline if you should be without a connection to Google’s servers. The solution features collaboration, so when you are editing a document a person that you shared the document can edit it at the same time and the changes are shown in real-time. E-mails of documents back and forth and be eliminated in this way. There is also a history where all the changes can be tracked and restored. Document formats that are supported are PDF, HTML etc and its possible to import documents, spreadsheets and presentations into Google docs (Google, 2009a).

7.3 Salesforce

7.3.1 Salesforce's view on the Market

Salesforce considers itself as one of the main promoters of Cloud Computing, which is their core competence. While other players have only recently entered this new market, Salesforce has already been in it for ten years. More and more applications and platforms are being constantly moved into the Cloud.

Cloud Computing offers time-savvy and risk-free solutions; therefore it gives companies the opportunity to focus on innovation instead of maintenance.
Regarding pricing, Salesforce claims that in general 53% of all IT projects break the budget. However, with Cloud Computing there are no hidden costs, such as upgrades or maintenance. Cloud Computing allows for pricing transparency. While traditional software services contain a lot of internal hidden costs and don’t allow for the clear calculation of the total expenses in advance, Cloud Computing allows the costs to be spread out as the solutions are being delivered.

Cloud Computing also offers stability of servers during peak hours, when data transfer reaches very high levels over short periods, therefore not allowing the system to fail, like it happened for example with a Swedish cable TV. With Cloud Computing there would not be any need of buying additional hardware and software to cope with this problem in the future.

7.3.2 Salesforce’s Strategy
Salesforce provides a Customer Relationship Management (CRM) solution built with Software as a Service technology. At present they have 55,400 companies that use this service. The advantage is that the solution is built on Cloud Computing technology so the customer can get the services up and running right away with their CRM solution. It is also more affordable than traditional software (Salesforce, 2009a).

The Salesforce business model allowed them to increase their turnover in only 5 years from 25 million dollars to 1 billion. Every company providing Cloud Computing solutions has its own strategy. Salesforce’s strategy is to build an extremely scalable architecture, and to constantly maintain the consumers’ confidence in their solutions, in order to continue paying their subscriptions and provide revenue for the company. Cloud Computing allows automatic updates for the software and the users don’t notice these updates, but only the newly offered features in their applications.

Their customers are one third small companies, one third medium and one third big-sized companies. At present, more and more SAP customers – one of their competitors - are moving to Salesforce.

They have also gained a very important customer, the Japanese Post, which had problems with the reliability of delivery services. Implementing a traditional system would have taken 3-4 years, while Salesforce allowed them to create an application system in only 4 weeks and deploy it throughout the entire organization, to all their users.

Each of Salesforce customers have different requirements, therefore the products they are using are customized, according to customer’s needs. Salesforce owns three global data centers.

Salesforce solutions help customers to develop their projects much faster than with traditional software, therefore being able to implement their solution over a short period.

Force.com is Salesforce’s Platform as a Service solution. They are extending their existing Software as a Service CRM solution to be a fully-fledged platform for development and hosting of user created applications. They focus on market segments such as enterprise resource planning, human resource management and supply chain management. They claim it is the fastest way to develop a complete application from scratch. Companies will therefore be able to focus more on innovation. Salesforce says this is all about running one’s business in the Cloud. They have already more than 800 applications for the platform provided by third party developers, which are available for the users to install. Until now, the
users of force.com have created about 100,000 applications using the platform (Salesforce, 2009b).

7.4 Sun Microsystems

7.4.1 Sun Microsystems View on the Market

Cloud Computing will be growing fast in the coming 2-3 years, especially in medium sized companies. However, Sun Microsystems consider the market to be ready now to accept Software as a Service as a solution. The driving force for the adoption of Software as a Service is its ease of use. It will be much easier and take less time for companies to develop new solutions for the Cloud instead of using traditional software.

In their opinion, the main issue is the security of data storage; companies are afraid that their data will be less secure in a Cloud. Moreover, for financial institutions the lag that a Cloud solution might create is a problem, as such institutions need access to real-time data and there can be no delay in the delivery of the information.

They also consider that there is no real threat to Cloud Computing, except some possible governmental regulations that might be created after a big crisis in the world, that could represent a threat. The next 10 years will show how much supervision and influence from public third parties will be over the Information Technology market.

7.4.2 Sun Microsystems Strategy

Sun offers hardware and software solutions mainly for IT developers. Solutions that Sun provides for other Cloud firms are also being used in their own Cloud system. Their main strategy since 1980s was to stick to their core competences, development and networking. Sun also seems to place a lot of value on their knowledge and their position in the market in order to provide only the right products they know they are good at.

Sun is currently improving their Sun Cloud that was released last year, 2009. They are providing a solution for the customer that will cut down costs and improve efficiency. They built their Cloud on open standards to make it open and compatible with other vendors, and also stronger against competition. This entire approach means that the customer have more options.

7.5 The Case of IBM

7.5.1 IBMs View on the Market

IBM strongly believes in open standards for any type of technology, including Cloud Computing. IBM argues that without open solutions and open standards, technologies cannot evolve. They also consider efficiency and competitiveness of outsourcing to be of utmost importance for the future of IT. Cloud Computing is mainly important for its availability, scalability and flexibility when it comes to investment, due to the cost-sharing opportunity. Another strong point for Cloud Computing is that it is great for companies and institutions that need to compute vast amounts of data, such as scientific institutions. Cloud Computing can be divided in two types, one dedicated for hosted solutions and the other for Multi Tenant solutions, with public resource sharing.
Cloud Computing can be a solution to move forward. However, the adoption of Software as a Service is very slow in Sweden, compared to countries like Egypt which are strongly investing in cutting-edge technologies.

### 7.5.2 IBM’s Strategy

IBM’s strong belief that open standards and solutions is the way to go in the IT market also reflects in their own strategic approach and the way they develop their own solutions. IBM is the biggest outsourcing company in the world. They provide Lotus (email and collaboration software) which is their most famous product, among many other solutions they provide. They also provide solutions for online banking and mobile phones, and also an Open Office, compatible with Microsoft Office. They also offer a public Cloud called Lotus Live to their paying customers, where emails and web-meeting services are included, aside from electronic forms, traceability, instant messaging, etc.

IBM has also made its products available in the Amazon Cloud, therefore companies don’t need to develop their own system, but use the EC2 service (from Amazon) to develop their own solutions.

IBM offers their own solutions in collaboration with many other companies. They collaborate with Google on developing solutions for the health care system. IBM customers have the opportunity to choose services from other suppliers to build onto their own solutions. IBM doesn’t lock their clients to their own solutions, but they set them free, since IBM believes they can’t satisfy all their customers’ demands. IBM thinks it is important to be part of the Supply Chain, without being visible all the time. IBM has also been involved with technology in the development of LinkedIn and Skype for example.

Safety is important for IBM and it is implemented carefully at both internal and external level.

### 7.6 Amazon Web Services

#### 7.6.1 Amazon’s Strategy

Amazon is another player which has been around for quite a while. Even if they started providing their Cloud services on the market only 3 years ago, they have been using them internally for 10 years already. Their growth has been quite rapid, having already half a million registered users. Their solutions allow users to run applications on virtual servers, with an Operating System of their choice.

Amazon’s Cloud solution is called Amazon Elastic Compute Cloud (Amazon EC2). Their solution is “elastic” and scalable, meaning that servers’ capacity can be increased or decreased within minutes. It also allows automatic scaling, in a way that the applications automatically adjust the number of servers they require at a certain moment to support the flow of data. Aside from the Operating System, the user can also decide what programming languages and features he/she will be using for the running applications. Because of the scaling features of the Amazon Cloud, one only has to pay for the resources one is actually using. (Amazon, 2009)

Getting started with Amazon web services only takes minutes. Interaction between user and the Cloud is very simple. Amazon also has a great reputation of being security focused, offering their customer detailed information about the way they handle their data.
Amazon Cloud is easy to scale up and down, and the customer only pays for what he/she uses. There are no commitments, just a very simple pay-what-you-use scheme.

S3 is Amazon's highly durable Internet storage solution. In order to be secured, the information is mirrored on different data centers. In case of one data center failure, data is saved in other server centers at different locations.

Amazon provides a service called Amazon Import-Export. For users having an Internet line providing 1mbit/s, data transfer might require a longer time, especially for larger amounts. Therefore, Amazon allows users to physically ship the data to their premises on tapes, DVDs, etc.; Amazon will then place the received information into the user’s account. The result can also be physically shipped back to the customer.

Amazon Cloud is available in US and Europe and there are plans to expand to Asia.

7.7 A Telecom Company

7.7.1 The Telecom Company’s View on the Market

In their opinion, the main advantage of Cloud Computing technology is the low costs for investments, which is a benefit especially for startups; another advantage is the simple way of software development in the Cloud, since the computer infrastructure is handheld by another company.

However, security is really important when it comes to Cloud Computing. The Telecom Company suggests that one solution to this could be to establish an internal Cloud where all data is stored on premises. This is mainly an issue of trust; it was the same with electrical grid networks 100 years ago, when companies had their own electrical production.

Regarding standardization of the market, they believe no standards are being formed yet, since the market is just starting up. Small companies tend to focus more on Software as a Service, while larger ones on Infrastructure and Platform as a Service.

7.7.2 The Telecom Company’s Strategy

The Telecom industry is more focused in interoperability and there are standards (e.g. GSM) to make the technology work independently, regardless what operator and provider clients are using, contrasting with the IT industry, driven by de facto standards.

The Telecom Company’s core competence is to provide optimal solutions to their customers, mainly Telecom operators. Even though today there is no specific strategy yet on the Telecom market about how to relate to Cloud Computing, but they are watching the market development closely and are ready to act when they feel the right time has come.

7.8 Capgemini

7.8.1 Capgemini’s View of the Market

Cloud Computing is regarded by Capgemini as the source of energy for the IT market, which allows customers to create their own power supplies. Using Cloud Computing as a source to supply with “energy” other industries too, proves to be a very cost-effective and time-savvy procedure, also allowing for production scaling. Companies are vitally dependent on data centers today. On-the-premise applications can be metaphorically compared with Edison’s idea that each industry should have its own power supply. We can compare
computer resources to electricity; therefore, we can say that we are now in the Water Wheel Age of Cloud Computing.

The technology used and currently being developed for the Cloud is very advanced, even at this stage. According to Capgemini, information storing and virtualization are two of the technologies used in the Cloud. Applications are part of the Cloud and so is the ability to create customized solutions inside the Cloud. There is no fixed rate users have to pay for the Cloud services they are getting; they only have to pay on a per use basis.

The founding layer of the entire Cloud is built upon Open Standards, it is used for information exchange over the Internet and it is vital for the existence of the Cloud. Open Standards between smaller Clouds are really important, especially to the extent are they being integrated today. However, Open Standards create strong feelings among IT people. Some people in the IT industry organized an Open Source demonstration in Norway in 2008, concerning the ODF (Open Document Format) file format for documents and the standardization process of the format. In the end the Standardization Committee decided on two formats instead of one; Microsoft's .docx was one of them, in spite of the fact that 97% of the participants wanted only one.

The demonstration says a lot about the importance of Open Standards. The Open Cloud Manifesto, for example, is one initiative that was taken in order to standardize the Cloud in the future. Its aim is to try to implement Open Standards in the Cloud for various reasons, such as security authentication and integration of different applications, but the main goal is to support users' freedom, that is to avoid users being locked to only one Cloud services provider.

In the end, we would like to note Capgemini's observation about the existence of the Private Cloud - a variation of the Cloud. It uses the same technologies, but it is built within a company's walls. Strong reasons to build a Private Cloud can be safety and security that is needed for sensitive data. One example of a Private Cloud is that Japanese government has implemented their own Cloud.

7.9 VMware

7.9.1 VMware's View of the Market

VMware considers Cloud Computing to be a great solution for solving the problem of server overloads. When traffic to a company's website increases dramatically for a limited period, there are two solutions: the company should either buy additional servers or rent them from a Cloud Computing provider.

During their business activities, companies have to pay their providers for handling resources they rent/buy from them. Today companies experience a low usage of their computer systems; most companies have a usage under 20%. The computer systems shall be used to increase the competitiveness of the company. In a marketing campaign for example the traffic to the servers can increase dramatically. Acting traditionally in this case would mean to purchase additional servers and it might take time to get them up and running. On the other hand, Cloud Computing proves to be a much quicker solution to solve this issue.

Cloud Computing also makes it possible to develop software faster. Programs can be tested on different servers and Operating Systems, without having to buy them as in the traditional way.
Moreover, CIOs are exposed at their positions if there is not enough capacity to run the business activities. This leads to an over-capacity in the systems. They also hesitate to install new systems because that jeopardizes their positions if something goes wrong, such as disruptions in the systems etc.

There are demands on the IT departments that they shall be flexible and be quick to answer requests. Two thirds of these departments’ time go to administration for their existing systems. Now when companies have to cut down and save money it will also affect the IT departments. On the other hand, with Cloud Computing solutions companies can install a new server in a couple of minutes. It is much faster to satisfy the demands.

However, it seems that larger organizations are slower to move to the Cloud, while smaller organizations are faster. Private persons are running solutions such as Webmail and websites in the Cloud. It is easy to move information into the Cloud but harder to pull the information back from the Cloud. The latest trends show that business operations need faster changes. The implementation processes are shorter and fast decisions and actions are required to keep up with the pace.

It is also important that the systems are built upon standards to make the transition to the Cloud possible. The hardware is not the important part but the applications and the information.

### 7.9.2 VMware’s Strategy

When they implement services at their clients, VMware starts at an internal level and builds the communication between the different data centers, into a private Cloud. Their clients are not bound to any special provider. With a standard platform firms can get local providers so that their data will not leave European Union or even Sweden’s borders. What matters is to connect the data centers and build up an internal Cloud. The payback time for the investment into an internal Cloud is only 6-9 month.

### 7.10 Apple

Mobile Me (me.com) is Apple’s Cloud Software as a Service solution. With Mobile Me one is able to read one’s mail, store files, and edit one’s calendar. One will also be able to sync all data such as emails, contacts, and calendar with Apple devices such as notebooks, iPhones and iPods and even computers running Windows (Apple, 2010a)

Apple has also recently launched iWork.com, as a complementary solution to its iWork office suite, since the software cannot be edited online at the moment. One has to buy iWork suit to get access to these services, but it offers simple solutions such as document editing, and developing presentations and spreadsheets online (Apple, 2010b).

### 7.11 Modull

#### 7.11.1 Their View on the Market

Modull believes that due to the value-creation and opportunities for innovation that Cloud Computing brings in, companies will have more time and money to invest where the real need is, for example in R&D. Change processes will gradually increase in speed, therefore companies have to be ready to quickly adapt to changes. Modull estimates that in Sweden 5000 IT jobs will disappear in the near future, but 7000 new types of IT jobs will be created due to the newly implemented Cloud technologies.
One of the main strengths of the Cloud is that it offers resources at discretion, resources that one can buy only when he needs them. Traditional expansion for a company involves a big risk of getting too many users too quickly, and the risk comes from not investing properly in the infrastructure to keep up with the pace of increasing users. On the other hand, the Cloud offers a company the capacity it needs at any time.

7.11.2 Modulis Strategy

Modulis is a consultancy company in Sweden providing IT solutions to their clients. The company saw a need for small businesses to monitor for money laundering, for which there is new government regulations that companies have to meet. Trust is really important when providing such Cloud solutions. The clients do not have to buy complete solutions. They can buy parts of it just as the music industry allows customers to buy just one song instead of a whole album.

7.12 IS Tools

7.12.1 IS Tools View on the Market

IS Tools does not believe that Software as a Service is really a new concept; it is just a new way of distributing software. Today Software as a Service is more common than Platform as a Service, because it represents a more attractive market. They consider that for the end-users it doesn’t really matter what solutions they are using, as long as they work. They give as example companies that are using Platform as a Service without actually developing solutions that can be included in this specific framework.

IS Tools consider the market to be ready to adapt Software as a Service as the Internet has become faster; it also does not matter much where the data is stored today. Platform as a Service is more aimed at bigger companies, as they need a flexible alternative for deploying their software solutions into the Cloud. On the contrary, Software as a Service is more suitable for smaller companies, as they do not need very flexible solutions.

The collaboration benefits, such as document sharing in Cloud Computing, are useful in a company that has a distributed environment. This makes it easier for the company employees to collaborate and access information.

Threats to the Cloud Computing market can be a failure of implementing Cloud solutions in a big company; this would highlight the possible flaws of the Cloud technology. Also, security problems can be a reason that would hold back the adoption of Cloud platforms at a large scale.

In the future, main players such as Amazon and Google will probably be compatible with each other, but there will still be problem to transfer data from one Cloud to another in an easy way. The market for consultancies will probably get smaller because of the new Cloud platforms. It is easier to re-use and configure existing solutions than develop a full solution from the bottom.

7.12.2 IS Tools Strategy

IS Tools is a company situated in Sweden delivering Platform as a Service solutions to their clients.

IS Tools is a Java based Platform as a Service solution. They provide a browser-based solution for building, deploying flexible and complex business applications. The solution can be
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placed on premises at a company or hosted by IS Tools. This can also be changed according to the customer's wishes (IS Tools, 2009).

IS Tools describe their service range as Platform as a Service solutions. They do not let their clients (and this is not in their business model) to develop their own application for their platform. They let their users customize applications by “gluing” different blocks together in order to adapt the software to their needs. They do not license any technology for their platform; everything has been developed by the company in-house.

7.13 iCloud

7.13.1 iCloud's View on the Market
There are many platforms today that need to be maintained such as different OSs. This has to be solved and the solution is Cloud Computing. Cloud Computing might blur the line between devices as the information is accessible from everywhere with a connection, the Smartphone might become more like your computer. iCloud believe that there will be a gradual movement of data into the Cloud.

7.13.2 iCloud's Strategy
iCloud is a startup that are developing their own platform and software for the cloud situated in Sweden.

The technologies that are used for their iCloud service is developed fully in-house; they do no licensing or buying to acquire tech to their platform. iCloud is a startup, so they are about to create and define their core competences. They definitely have a strong ambition to create a novel solution when developing their Cloud solution.

The company's growth strategy is product development. They have a novel product that started the development in 2001 and now they just introduced to the market. They have a unique take on the Cloud as they try to mimic the look and feel from traditional operating systems.

7.13.3 Risks that might halt the adoption
The risks that the whole IT market fears when it comes to implementing Cloud Computing solutions are the risk of data loss and the security of information stored on third-party servers.

According to Jakob Heidbrink, Assistant Professor in Law at Jönköping International Business School, there are many juridical issues to be taken into consideration regarding storing sensitive data on suppliers' servers. There are always uncertainties and misunderstandings on how the law should be interpreted and applied in this regard. Heidbrink notes that these issues are treated differently by different parties in the IT landscape. For example, technicians believe that juridical problems are to be handled after the problem occurs. Business people tend to adapt the technology anyway, if it is cost-saving, i.e. if the savings are higher than the risk, they will go for it. Lawyers tend however to be conservative and look more at the inherent problems in the technology. Clients should also be aware that the providers do not hold the legal responsibility for the data they store on their servers, since they just provide the storing services. The safety of the data and the duty of saving it in a responsible manner is still the duty of the customer. Sensitive data can be for example stored on local premises rather than on the provider's servers. Nowadays we still store our
important data on local hard-disks. However, the hard-disk manufacturer doesn't guarantee the safety of our data. Since there is a risk of hard-disk failure, it is our duty as users to save the data on more than one disk. When these safety concerns will be solved and users will understand their responsibilities, we believe that the security of data will not represent a major setback to the adoption of Cloud Computing.

Another issue of major concern is the case when a provider goes bankrupt. What happens in this case with the information users have stored on the provider's servers? The claimants want to recover from the bankrupt estate as much as they can. Therefore, there might be the case that they sell the servers with the sensitive data of the customers to a third-party. Even if the data is erased previously from those servers, it can still be easily recovered by the third-party buyer. It is also unclear who is the owner of the data on a server operated by a supplier – is it the customer who owns it 100% or is it also the provider? If there are still payments to be done by the client for the storage service at the time of bankruptcy, it is unclear who will be the rightful owner of the data stored on the bankrupt company's servers.
8 Analysis

8.1 Current Status of the Cloud Computing market

Based on the case studies of the main players, presented in the previous chapter, it is very interesting to note that all players have almost similar opinions about the overall development and current status of Cloud Computing, but they differ in their views regarding the future of the market and of the product itself.

Therefore, we will proceed with a general analysis based on each player's opinion about the current state of Cloud Computing market, their interpretation of Software and Platform as a Service, and try to determine where is the market more likely to head in the future.

The market for Cloud Computing is an emerging market, still young, but developing fast. By looking at the Ansoff Matrix, we can determine that currently the market is in the product development phase and still fragmented. It features a few important players competing for the main strategic positions and also a certain number of smaller companies, trying to get a smaller share of the market by providing their original solutions. Different technologies are being developed by different players, but they are still not enough to overcome the traditional software market. As Microsoft puts it, the market is increasing fast, but from small numbers. Furthermore, Capgemini compares traditional software to the electricity market in the beginning of the 20th century where all the factories had their own power supply. They believe that the software market will go the same way as the electricity industry and consolidate to a few providers.

From the product view, using the Abernathy-Utterback model, at the moment we can affirm that Cloud Computing is in a product innovation phase. We consider the introduction of the Cloud technology on the IT market to be a radical innovation, whereas all the services and products that are part of the whole Cloud technology to be incremental innovations. We can also state that Platform and Software as a Service are incremental innovations. According to Utterback (1994), when a radical product innovation is introduced to the market, it will eventually lead in time to a dominant design.

Furthermore, continuing to use the Abernathy-Utterback model, we also consider Cloud Computing to be a competence enhancing innovation from the perspective of the company offering it because, even if it means a completely new product, it is still built on existing knowledge derived from software programming and development.

Interestingly enough, according to all of the interviewed players, there are no clear general standards yet defined in the Cloud Computing market; each player is following more or less its own path, even though some of the basic technologies, such as Java, are regarded as standards in the IT market.

In the same time, there are many technologies that have to be built around the Cloud in order to provide an attractive final product; these are not standardized yet either. According to Microsoft, standardization is a goal not to be followed yet; the companies should focus more on innovation before they aim for standardization of the market. There is a lot of experimentation and the technology is developing at a fast pace. IS Tools is also considering that standardization is not yet welcome, and the market should rather continue to focus on innovation. Furthermore, there is no standard design and different companies offer different solutions to the same problems.
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All the above, added up with the Abernathy-Utterback model, give us strong evidence that the Cloud Computing market is in the fluid phase of the model, a phase in which the players are still small. According to Utterback, market players should watch out at this phase for new potential entrants to the market, such as startups similar to iCloud or another major player from the traditional market that decides to take advantage of the new Cloud Computing business opportunities. Moreover, old software technologies are still holding users back from joining the new Cloud Computing services.

The Abernathy-Utterback model states that, after the transition from fluid phase to transitional phase, a dominant design will finally emerge, and the market will start to slowly accept the Cloud Computing as the main product, instead of the traditional ones. In the same time, the products developed by each player will have less differentiation on the market, because they will be produced at a large scale. Competition between big players like Microsoft or Amazon and smaller ones like iCloud should decline gradually after the emergence of the dominant design.

In this phase, Utterback suggests that the companies should focus on understanding customer's special needs and hence on developing solutions for these needs. They should also watch for imitators which might take advantage of the dominant design and flood the market with lower-quality but cheaper services and products.

According to Microsoft, Sun Microsystems and IS Tools, the Software as a Service market is stronger than Platform as a Service and developing faster; moreover, it is much more rapidly being adopted by users.

However, while Microsoft thinks that the market is not ready to adopt Software or Platform as a Service yet, Sun Microsystems and IS Tools believe the contrary. iCloud is on their side; being a smaller player whose business is entirely based on Cloud Computing technology, they think that Cloud Computing in general is the answer to all the current problems regarding the IT market and definitely the path to follow in the future. The industry is very young and is just about to take off. There is an accelerated demand for Software as a Service solutions; this indicates that the technology development has reached the take-off stage.

Also, the fact that many companies are marketing themselves as Cloud Computing firms has probably made the technology take off earlier than it would have done otherwise. This also means that the market is approaching the early majority stage of the Diffusion S-curve.

Regarding Platform as a Service, it can be regarded in our opinion as an incremental innovation over Software as a Service and the companies we interviewed believe it will develop more as the market grows. Moreover, there are many players with different opinions regarding how to separate Platform from Software as a Service. Therefore, we will not analyze Platform as a Service separately, as it would make it less relevant.

We motivate this decision by considering the fact that in the mid 90s, many developers and even software users were using their own or third-party software to support them in their businesses. These programs have been used on local computers as traditional software. Later on, Software as a Service has been adopted naturally by many of these companies, including both users and software developers. However, as the time passed, they started to realize the shortcomings of this technology, i.e. the fact that Software as a Service providers have little possibility to offer the whole range of software applications their clients ask for.
Analysis

This is the moment when Platform as a Service comes in; Platform as a Service will make it easier for companies to put any app developed for the Cloud on the platform. Therefore, we consider Platform as a Service to be a natural evolution from Software as a Service, as the technology is constantly developing. In this way, clients will not be tied-up to only one software provider and will be able to provide additional applications to the Cloud, other than the ones offered by the provider.

However, we do believe that local software will still be used along with the Cloud for the foreseeable future, especially by the end-users.

We also notice that there are some differences in the maturity of different layers of Cloud Computing. These differences are more relevant to small companies as they have different preferences on what is important to them.

Software as a Service is a good solution for medium sized companies as they need standard solutions to support their processes.

Larger companies need more customized solutions and then a Platform as a Service solution to customize their systems would be a better fit for them. Since Platform as a Service is located on a less mature layer of Cloud Computing, the adoption by larger companies will take longer than the one by small and medium sized companies. As iCloud notes, bigger companies might need more custom-made solutions to support their processes, when standard solutions such as Software as a Service are not enough. Smaller companies can accept the more standardized solutions as their processes do not have to rely on customized software.

8.2 The business strategies in the Cloud Computing market

To better understand the development of Cloud Computing and the companies behind it, we would like to put forward the basic strategies of the strategic players in the market, which have the most influence on the development of the technology.

![Ansoff Matrix](image)

Figure 8: Strategic companies put into the Ansoff Matrix.
Analysis

Placing all the big strategic providers of Cloud Computing solutions in the Ansoff matrix (Figure 8) creates some interesting results. All the companies provide new products and are therefore put in the New Product column. The Existing Products column will therefore remain empty. The main players differ however in terms of market strategy.

Microsoft, Salesforce, Sun Microsystems and IBM are placed in the Product Development Cell.

Microsoft is included in the Product Development area because they are simply using their current in-house technologies to develop their Cloud solutions. Their main aim is to do incremental improvements on their products, in order to satisfy their customers. They have a long history of providing productivity-improving applications and operating systems. On the other hand, Salesforce is a startup that has become the first mover and introduced their Cloud solution in as early as 1999.

Sun Microsystems are providing middleware to support other companies’ Clouds. They have extended their technologies to work better with the Cloud and almost all the providers of Cloud Computing are using some part of their software catalogue. Sun is continuously developing their products in order to meet the demand of the market. They have the same basic technology in the new market; however, it is only applied differently to the Cloud.

Sun keep their core competences, development and networking. These have been their strategic focus since the 1980s. They also stick to their knowledge and their position in the market in order to provide the high-quality products they are well-known for.

IBM extended their software products to make them available in the Cloud. Their email service and also the availability of their applications in the Amazon Cloud place them in the Product Development cell.

Google and Amazon fall into the Diversification quadrant of the matrix. They have more in common than one might think at first sight. Amazon has been very innovative in the e-business; they have been selling books online. To support the online bookstore, they have built a very robust and efficient system to support this internally. Amazon saw that other businesses needed such a system and asked themselves if they could provide it to them. Therefore, they have created a number of Cloud services that were offered to customers. Google on the other hand started up as an internet search company. To support all their services, they built up a system to support it. A few years ago, they also started to provide some Cloud services to diversify their business. Google and Amazon both saw that their internal systems and core competences could create some new services that they could provide to customers.

8.3 Further Analysis of the Current strategies of Major Players

After analyzing the interviews with the main players in the Cloud Computing industry, we can conclude that the strategies of the companies we have researched are in line with their current core competences and market strategies when entering the Cloud Computing market.

Google was founded as an Internet company. They started as an Internet search engine and later immersed into the Internet advertisement market, providing an innovative advertising
service, called Ad-sense. 99% of the revenues that Google makes are due to the advertising (Google, 2008).

Google’s business model and main core competence is to provide services via Internet. They started with the search engine and have extended from that to other applications. Their main strength is however to provide a powerful search engine as well as an innovative advertisement solution called Ad-sense, based on their search technology. Presently Google is trying to penetrate the Software as a Service and Platform as a Service markets. They have created their own Office software suit, with all the basic applications available to everyone to for free. Their revenue is based on advertisements shown on the webpage while the Internet surfer is using the Google software. The advertisement technology is also available to the users of applications engine, which is the Platform as a Service.

Presently, Google’s internal development is mostly directed to Software as a Service; one can notice this very clearly by looking at various Google applications, such as Google Maps (maps.google.com) or Gmail (gmail.com). These are Software as a Service solutions; however, many do not think of them in this way. In order to create services such as Google’s own Office suite, the development of Google docs is just a natural stage in Google’s evolution, followed by a future establishment of Platform as a Service (application service). They have to develop their own applications for the Internet and extend the business to provide a platform to customers fit right into their competence.

Microsoft has relied heavily on their software as long as they have existed. Their strongest products are Windows and their Office suite as well as their communication solutions exchange. As their history is different than Google’s, their approach is also rather different. They propose a solution called Software plus Service where one has to have software installed on one’s computer and just some parts are run on a server. Their approach to the Cloud is more to extend their current suite of services to satisfy the customers demand for online software.

However, their approach to Platform as a Service (Azure) can be regarded as quite different from their Software as a Service solutions. The customer can extend their current applications to take advantage of Azure. Microsoft is expanding their current preparatory developing platform, .net for Azure, as well as offering some development for standard solutions. Even though they are offering other developing alternatives, they are pushing for the user to use the .net development framework (Microsoft, 2010a).

Therefore, we can conclude that Microsoft are using their core competences and protect their business model. Their business model is to provide software applications and charge a one-time fee. They are slowly changing in their strategy of selling up-front Windows and Office to their customers and then offer valued services through Software as a Service. They believe that the future is Software plus Services, a mix of a traditional software model and Software as a Service.

Amazon started as a bookstore online in the 1990s. They realized that they can enter the Infrastructure as a Service market when they were developing their applications internally. They were able to do it at a large scale and with high. Other developers’ problems were noticed by Amazon who took advantage of them and transformed them into opportunities to start a business (Perez, 2009).

Sun Microsystems’ strategy is to create and develop standard technologies. They have developed such standards as Java, which is an important part of many Cloud solutions today. For example, Sun supplies their core technology Java to the developers of IS tools plat-
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form. Sun Microsystems mainly capitalizes on the services and the knowledge they have and the hardware they sell. They are probably the one company that has the longest experience in the standard technologies market.

8.4 Strategic options for the Companies based on their core competences and current market

As noted above, the current strategies make sense for the companies as they are based on what they know and do best, on their core competences; therefore these strategies will provide guidance to the path the technology will take into the future.

Microsoft might be able leverage their knowledge in developing traditional software and slowly extend their product with Software as a Service capabilities in order to keep their current user base. It would not make sense for them to develop a totally new platform and put their market at risk. People tend to react slowly to changes as long as there is no obvious threat. Microsoft’s solution should also be more accepted at IT-department as it is not a big threat to them. Pure Software as a Service solutions might be a way to bypass them and to not rely on them too much.

For Salesforce, Google, Amazon a more revolutionary change makes sense. They are new to the Software development market and do not have any previous clients to migrate to their platforms. We believe that the forming of a standard in Cloud Computing would be a competitive advantage for these actors. The client would not be as reluctant and see that they can use the new solutions without being locked to one provider. Also the developers could rely on one standard instead of making several different versions of their software.

The success will largely depend on how successful they are in deploying a standard solution and how they will be able to convince the customers to switch to Cloud Computing. The question is how many standards that will emerge in the future. It might the case that there will be two main standards developed in Cloud Computing instead of one; for example, one can be Microsoft’s own solution while the other one to stand for the other main players. Microsoft might also have to adapt to the future market standard, depending on how much Microsoft can leverage their current solution to attract customers. If they lose too many customers who are moving to the standard, then they might have to.

8.5 Strategies to add values to the offerings

Companies should target different segments for their Cloud offerings. Smaller companies can use standard software as they often have standard processes. This means that Software as a Service solutions are sufficient for them; they do not need the development capabilities offered by Platform as a Service. Of course, there are exceptions, such as companies which develop IT-solutions. For larger companies, a Platform as a Service solution is more appropriate as it provides the opportunity to customize more and to develop their own programs.

As Platform as a Service is starting to be adopted by more and more users and the platforms start to mature, there will be a stronger demand for software and increasing opportunities for developers. We believe that there is a need of an easy way to install and distribute applications for the platforms. Apple has already introduced their application store online for the iPhone and iPod products. It was launched in July 2008 and has grown tremendously. There are many developers for the platform as well as users that download and
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buy the applications. In just a few months, there have been over a billion downloaded applications through the application store.

8.6 Marketing the Cloud

Marketing Software as a Service definitely represents a bigger challenge than traditional Software, according to Cohen (2009). First of all, traditional software is a product itself, therefore easier to promote and advertise. Cloud Computing instead is not a simple product anymore. This is what the Marketing and Sales Departments of Cloud vendors need to understand (Cohen, 2009).

They need to promote not only the software features in the Cloud offer, but also the entire customer experience, such as ease of purchase, speed of deployment, access to support and other benefits. Cloud Computing is sold as a promise more than just a product, since customers are buying a future stream of deliverables, not a fixed set of product characteristics (Cohen, 2009).

The Marketing and Sales department need to win customer’s confidence in the ability of the software provider to deliver the whole package over the course of the entire subscription (Cohen, 2009).

Dym (2009) estimates that the demand for Cloud applications is very likely to grow at a fast pace in the near future. The advantage of Cloud Computing business model is that it allows for a variety of untraditional marketing techniques, which are beneficial for small and mid-sized companies, because they lack the financial resources for a complete marketing strategy. Such small companies or even startups can successfully employ low cost marketing techniques to “tell their story and convince potential buyers of the value of their solution” (Dym, 2009).

Traditional marketing strategies such as market penetration do not apply here, because market penetration is about selling more to existing customers, while the Cloud Computing market is a new market.

However, for major companies such as Microsoft, Apple, Amazon or Google, market development would be the optimal strategy to employ when extending their offerings to a new market (i.e. the Cloud Computing market), according to the theory section. One of the most important reasons for market development is the economy of scale in production.

Copying a competitor’s product and develop its own competing offer can also be an option for both major and small players alike, according to Burns (2005). This strategy would be a type of product development marketing strategy.

Other suggested strategies for marketing Cloud Computing solutions are guerilla-marketing tactics, face-to-face meetings that create “a much more powerful and lasting impression” (Dym, 2009), the option of free trial or viral marketing techniques, such as newsletters. The main purpose of guerilla marketing is to create a buzz, to spread the news about the product being promoted at a viral level. Guerilla marketing is also efficient because it can yield maximal results for minimal costs. Therefore, it can be successfully used by small companies or startups with low advertising budgets, such as iCloud.

The free trial option is considered to be a cornerstone of Cloud marketing program, according to Dym (2009), since it gives potential customers the no-risk opportunity to try the
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Cloud Computing of a certain vendor; it also helps the low-cost marketing and sales efforts to become more efficient.

Viral marketing is another option for Cloud vendors to “infect” customers with their products and have them extend the “infection” to other potential customers, their family or friends. If done in the right way, viral marketing can provide a lot of benefits to the Cloud vendors (Cohen, 2009).

Among the firms we interviewed, we found out that iCloud is the one who uses these non-conformist techniques the most. The main reason is that they are a small company, and as mentioned above, such techniques work best for small enterprises with low budgets. iCloud successfully uses both free-trial technique for users who want to try their platform; they also use viral marketing strategies, such as word of mouth or relying on satisfied customers to extend the “good news” about iCloud services to others. According to, the CEO of iCloud, iCloud is a “great user experience which speaks for itself”. Therefore, their own users are the indirect promoters of their service.

IS Tools also realize that they cannot market Cloud Computing themselves; therefore, they use their competitors as the best marketers for their offers. As the market gets bigger they can take a small piece of a bigger cake. It is hard to educate the market alone. Higher Level Analysis

8.6.1 Pricing Strategies

While traditional software is easy to be priced, being paid up front, when the customer buys the installation kit, it might seem difficult to price a service which is provided via Internet. However, the pricing strategies for the Cloud solutions can actually be regarded as very simple and much more cost-effective than the traditional software pricing methods.

Going through the price determinants explained by Baker (2006), we can determine that there is no dominant firm or industry leader formed yet on the market, which can set the price level to be followed by the other players, hence we will not witness a price rigidity either. Since this is a new market with a young product, we presume the price elasticity to be rather high instead, depending on how the customers will value Cloud services and how fast they will start substituting the traditional software solutions with it.

Being a new product, we also believe that brand names will play an important role in the customer’s decision to buy the product, hence big well-known names like Google, Amazon or Microsoft will give consumers more confidence in the beginning to purchase the Cloud services, rather than less-known names such as iCloud, Modul I or VMWare. Moreover, since customers have little experience about the product itself, we believe price will be an important determinant in the buying decision process, therefore the branding strategy should be clear and efficient, being able to convey what the product or the service is about.

Therefore, the pricing strategies the players should adopt must be carefully considered and analyzed. We are turning back to Baker’s theory which suggests there are two strategies one can employ to correctly price a product to customers.

First one consists of using a high price approach to “skim the cream off” the market, hence its name, skimming. We wouldn’t recommend this strategy in a new market like the one for
Cloud Computing, for reasons mentioned above, but rather for mature markets already segmented on quality and such. It can also be used when the product offered is very novel and unique, hence setting up a high price for it would suggest a “high quality” feeling in the minds of the consumers. Again, this wouldn’t apply in the Cloud Computing market, since the product is not uniquely offered by only one supplier.

Our suggestion is that in order to beat competition and gain rapid market share, Cloud Computing suppliers can rather employ a penetration strategy instead. This would be based on a low-price level to penetrate the market.

In the case of Platform as a Service, we can take the example of Apple, who introduced their online store for applications. They charge 30% of the revenue and the rest goes to the developer (Venture Beat, 2011). It is a relatively risk-free model for the distributor (Apple) as the investments into it are not that high. It would not be difficult to apply this model to Platform as a Service, as there are a lot of similarities. For smart phones there is no easy way to install applications and the same situation is for Platform as a Service. It makes sense to develop a model where one can buy an application with one click and then have it distributed in his/her Cloud. The application developer could either charge the user by a subscription or a one-time charge, where he/she only pays for the CPU usage and space used by the application in the Platform as a Service providers’ Cloud.

As described previously, Amazon has adopted for their Platform and Infrastructure as a Service a very smart and efficient strategy in terms of pricing customers, that is a pay-as-you-go scheme in which users pay based on how much resources they are using. This solution has the advantages of being scalable and “elastic”, so that it can tailor itself to the user’s needs in a matter of minutes.

Being inspired by Amazon’s solution, Software as a Service applications can be charged on a subscription basis instead. This includes the cost of the software application, hardware and people required to run it. This is typically a pay-as-you-go model, with costs directly linked to the usage of resources. The service subscription strategy is a very efficient one for market players since it kind of resembles a bank loan. Hence, instead of the customers paying a big amount upfront, they can start paying a small fee paid monthly, which will seem rather low and it will also create a steady cashflow for the service provider.

8.7 Standards

The Internet has a history of being open as it comes to standards. There is not one company that creates and sets the standards. The power is distributed among many companies.

On the other hand, Microsoft has a history of proprietary solutions and have themselves created the de-facto standards. This is one of the main reasons of their success with Windows (no other system can easily run software made for Windows) and Office (the office file format is Microsoft’s intellectual property). When the Software now moves from the desktop to the Internet, will Microsoft be able to leverage their dominance from the Operating System and Office software market into the new Software as a Service market? We believe that they will still be able to maintain their dominance for some time, as they have a large user base.

Google, regarded as Microsoft’s biggest competitor, relies heavily on Open standard solutions for their services such as Google docs. Sun Microsystems has also announced (March 13th 2009) that they will release their Open Cloud Platform. The platform will offer tools
that are based on Open standards and they claim that they will not lock-in users in any way with their solutions.

From the lack of existence of dominant design, we can derive that, once the concept of Cloud Computing will be accepted and adopted by more and more users and the market will move deeper into the fluid phase, it will become eventually more standardized and only a few types of platforms will remain available to users.

### 8.8 Possible Shortcomings of the Cloud technology

In this section we would like to discuss the possible problems and shortcomings of Software as a Service and Cloud Computing in general.

We would like to put forward some of the challenges that Cloud Computing has. From the case studies we can clearly derive that privacy and security are important topics for the main players. Companies have different opinions on how they are handled at this point. Stable connections to the Cloud are also important, since companies have their entire platform in the Cloud.

#### 8.8.1 The Privacy and Security Issue

First of all, one of the most mentioned worries among possible users of Cloud Computing is the privacy issue; it applies to both private and corporate users. Private users are mostly afraid of their personal information being shared by the Software as a Service vendor with a third party for commercial or advertising purposes; companies are afraid of data leakage, or the share of some sensitive inside information to a third party as well. This is one of the reasons for which financial players are the less likely to adopt Software as a Service in the near future, until this problem will be solved, according to Sun Microsystems.

There is even the fear that Software as a Service might give companies the possibility to access a very big amount of data from their competitors or from private prospective clients and use this information for their own benefit; this issue has been the most criticized by far.

According to IBM it is important to have a policy for security both internally and externally. It is not enough that the provider offers high security assurances to his clients and can protect their data. The clients’ companies themselves need to have security policies in order to protect the data access and allow no one that is not trusted to access the data. Capgemini notes that in order to protect data a private Cloud can be created in order to maintain safety and security; this can be a good way to protect especially sensitive data. One example is the Japanese government that has created their own private Cloud.

To protect customers from the loss of data the big providers such as Google and Amazon use the mirroring technology in order to both secure the availability and also recovery from the loss of data. The data is mirrored to several different data centers that are located in different places. In case something happens to one data center the traffic is redirected to another data center.

The Swedish Civil Contingencies Agency also notes that companies will have problems if a Cloud provider goes bankrupt. Then it is not clear what will happen with the data stored on its servers. According to them, the legal consequences are unclear when it comes to data stored on servers. There is a question about who owns that data, is it the customer or the
provider? He recommends companies to think twice when storing data on third party servers as it might create undesired consequences in the case of a dispute.

It is interesting to see that The Swedish Civil Contingencies Agency does not see the Cloud to be too secure; they are more hesitant as they see problems in the current outlook of the Cloud. The Swedish Civil Contingencies Agency notes that in the end there is control versus efficiency. We have to know what we are willing to risk.

In contrast to the concerns brought up by the Swedish Civil Contingencies Agency, Sun Microsystems argue that these law issues will be solved over time, therefore they will not represent a major obstacle for the adoption of Cloud Computing technologies. We also believe that juridical issues will be cleared up in time; hence they will not represent a major setback for Cloud adoption at a large scale, as the cost savings and operational benefits brought to the customers are major advantages.

Microsoft noted that the financial sector is not interested at all in Cloud Computing. The data is much too valuable, and they cannot risk its security and privacy in any way. They argue that leakage of information might hinder the adoption. The possibility of leaked information will make the Cloud Computing solutions to be perceived as a security risk and the adoption might slow down. According to optimist Sun Microsystems, the technologies nowadays are very secure; therefore, it is possible to have very safe solutions implemented in the company even if the servers are located remote from client’s premises.

Another issue we would also like to question is the existence of small players in the Cloud Computing market. According to all the present worries about the safety of data stored on servers, we consider that it will be very hard for small companies providing Cloud services to survive along with the big players, unless they will be supported by one of the big companies. Otherwise, we think that most users of Cloud services will be reluctant to move and store their data on the servers of a small player, which is more likely to experience data loss.

8.8.2 Connectivity Issue

Another issue which causes dissatisfaction among both private and corporate users is the connectivity issue. Users are still afraid that the servers of the Cloud vendor might get stuck in delivering the information due to very high levels of traffic demand, and the speed at which the data is delivered to the customer might be slowed down in such cases. This is another reason, according to Sun Microsystems, for which financial players, especially banks and trading companies, will not switch to Cloud services any time soon, as for them the speed of data delivery is vital for their businesses. However, this issue of bandwidth is likely to be solved in the near future, due to technological improvements in data transfer methods.

8.8.3 Cost Savvy Issue

Based on the Productivity Paradox concept that we detailed in the Theoretical Framework section, some analysts state that IT technologies do not improve the productivity in a company; investments in software and hardware actually increase the overall costs for running the business.

Therefore, we think we should ask ourselves if the Software as a Service model is actually that efficient as so many of its promoters say it to be.

Garner is reporting that Cloud Computing might not be as cost savvy as companies might think. There might be a misconception about its efficiency and the total cost of implement-
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ing a Cloud solution in a company. Although it might cut down costs in the first two years after its implementation, it might happen that in five years the Software as a Service will become even more expensive than a traditional software solution (cited in King, 2009).

One thing worth mentioning in this case is that even though Cloud solutions save users a lot of hassle from maintaining and upgrading the software itself, they still need an IT infrastructure to access the Cloud, and these computers have to run the latest security updates and firewalls (Marks, 2008). Moreover, clients are the ones who have to take care of these tasks and all these imply costs which the Cloud vendors do not specify in their marketing campaigns.

However, based on the research being conducted in this paper, we believe that Cloud Computing will actually solve the productivity issue, which troubles the IT investments and development in the companies; it will sustain the productivity growth and reduce the costs, by offering scalable resources and services.

8.8.4 IT Department Reluctance to Software as a Service Implementation

In a company, the representatives of the IT department are especially skeptical against implementing Software as a Service solutions. As SUN Microsystems mentions in the interview, these IT specialists will always find a thousand reasons for which not to implement Cloud Solutions. Booth (2008), quotes several CIOs and IT directors who are skeptical to the new model of software usage provided by the Cloud. One of the main reasons according to them is their bad experience with old ASP (Application Service Provider) solutions, where traditional software is distributed over the Internet or local network. In opposition with them, Booth (2008) believes that this is the way it should be; Cloud solutions have a much better infrastructure than traditional software solutions and there is much better support for the product. Furthermore, Software as a Service does not have the licensing issues that ASP has; the bandwidth is higher today and also the software providers are offering their own solutions.

There might be one more hidden reason for which the IT department of a company is such an aggressive fighter against Cloud Computing. As Cloud solutions become more mature, it could be seen as a way of bypassing the IT department. This might create tension between the management and the IT department. A study from Gartner shows that 75% of all Software as a Service products are bought by unit managers instead of IT managers (Booth, 2008).

8.8.5 Server Stability

One of the dangers that Cloud services clients might experience is that if the vendor’s Cloud servers go down, so will the businesses that run on those servers, until the servers are put back in functionality. (Fitzgerald, 2009)

This is a problem that is very likely to happen to Cloud, therefore a professional management of the servers and a correct estimation in advance of the periods with higher data traffic levels could be good solutions to avoid such problems. Alternative servers that can be used when one server goes down can also be another way of handling this issue successfully. The technology of mirroring developed by Google and Amazon can also be efficiently used in this case.
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According to Microsoft it is crucial to maintain a high uptime running level on servers in order to serve the customer. If the data centers and access to information is disrupted and the customers’ businesses get affected, the clients might take the data back and return to traditional software.

Main players are aware of this problem and in most cases, the right measures are taken prior to any server failure.

8.9 Learning effects

According to Schilling (2005), the more a technology is used, the more it is developed and the more effective and efficient it becomes. Learning effects and network externalities could be two primary sources of increasing returns for the new Cloud Computing technology, once it is adopted by users.

We consider this to be the case of Cloud platforms, once the number of customers using them will increase. Being adapted by more and more users, Cloud Computing will generate more sales revenues, which can be reinvested in further development and refining of the technology. Cloud vendors will accumulate more experience with the technology, thus they will be able to use it in a more productive manner and improve the implementation process of the technology. The learning curve will have a positive impact on the costs and productivity and allow Cloud vendors to reduce input costs and increase output performance.

8.10 Network Externalities

Creating networks externalities on the Cloud Computing market is a positive outcome that generates value when the technology will be widespread.

According to Schilling’s (2005) statements about the positive value of externalities, we can conclude that the value of Cloud Computing will increase once its size on the market will increase. The more users are accepting Cloud Computing, their utility from using it will increase, because they will use the same applications and get the same benefits from them. It is the same case with Mac users. In the past there were not so many people having a Mac, therefore buying a Mac would have meant that you didn’t have many other users to exchange software or applications with.

When Salesforce first introduced their Software as a Service solution back in 1999, there were lots of skeptics to the concept of accessing software online through a server. They were first movers in an emerging industry where the software moves from the PC’s hard disk to online servers. Now that has changed as the market is developing fast. All major computer companies have some kind of Cloud services today.

8.11 Usage of S-Curves

Managers of companies providing Cloud services can use the S-curve models as a tool for analyzing when the Cloud technology will reach its limits and as indicator for when or whether their company should move to a new, different technology. To better analyze this, they can use data extracted from their own investment and technological performances or even from the overall industry investment in the Cloud.

It also helps remembering that trying to introduce a new technology innovation such as Software or Platform as a Service to the market quickly and massively is a mistake. It is ad-
vised and logical to try to convince first innovators and early adopters, who will themselves, later on, convince the other groups of individuals.

8.12 The Future of the Software Market

Generally speaking, the Cloud solutions are already being implemented in the market. Many companies developing web solutions or offering other kinds of IT services are already using partially or completely the facilities of Cloud Computing. When interviewing a person working at a Romanian software company, developing Web 2.0 applications for domestic and international customers, he mentioned that all the competing companies he knows are “working in the Cloud”. In their case, they are using the Infrastructure as a Service provided by Amazon, i.e. they are renting virtual computers from Amazon to program and run their own applications. 10 years ago, a software company just entering on the market would have bought 2-3 computers to start developing their applications. Later on, as the business expanded, they would have needed to buy additional computers. In the case that the business did not work anymore or would have been bought by a bigger player, the owners of the company would have been left with a certain number of computers, an inventory which could or not be amortized. Nowadays, the same company using the virtual computers of Amazon would not face the same situation, as they did not have to invest in any additional physical machines.

We consider that the Cloud market is currently about to move from the fluid phase in the Abernathy-Utterback model to the transitional phase.

This will mean that the differentiation between the Cloud solutions offered in the market will be less diversified. Also, a dominant design will start to emerge, hence creating a new “de facto” standard in the IT Industry. As stated by Shilling (2005), markets tend to focus naturally on a single dominant design rather than struggling to support various technological options. The more Cloud Computing is adopted as a technology, the more valuable it become, according to Shilling (2005).

Microsoft has a strong position in the operations system market as well as it comes to applications such as Microsoft Office. In the short run they will probably be able to use their customer base and move them to their own Cloud services. It is possible that Microsoft’s Software plus Service will gain large popularity in the short term but in the longer term more “pure” Cloud solutions will probably gain more market share to fully take advantage of the positive effects of the move to the Cloud. In the longer run Google and Amazon can gain market share and be able to be more competitive against Microsoft.

As there are more benefits than disadvantages for adapting Cloud Computing, we assume that most companies are willing to adapt to this new technology. There is a clear cost benefit and companies can think less about their IT infrastructure, as it will be outsourced to Cloud services providers. The first ones to adopt Cloud Computing will be smaller companies as they have fewer complex demands and can easily accept standard solutions to their problems. They can apply a Software as a Service solution to their business and focus on their core business. Larger companies will come in a second wave as their demands are more complex. They need customized solutions that are developed to support their specific processes. Larger companies definitely need a Platform as a Service solution, which today is not as developed as the Software as a Service component of Cloud Computing.
Conclusion

9 Conclusion

The Cloud Computing market is moving forward in a fast pace. The technologies are still crude and there is a lot of experimentation. There are a lot of promise in the technology and what it can provide to companies. As long as companies will continue to outsource activities that do not bring any direct value to the company, Cloud Computing will be an attractive solution. The service will free up competence within the company; therefore companies can concentrate on what is most important to them. Further it will be a way of freeing up capital and save money.

For bigger companies the Cloud solutions will enable them to increase efficiency, develop their own solutions and deploy them much faster than today. Smaller companies will enjoy standard solutions that support their business and also great scalability qualities that enable them to grow without being hampered by the IT system.

There are still a number of issues that need to be solved in order to reach the mass market. Security and privacy issues are the main ones. There are different beliefs regarding how mature the market is but even if the issues are perceived, which we do not believe, they have to be solved. Measures have to be taken in order to secure the data and show to customers that their stored information is safe. The recent intrusion from China into Google's servers stealing information from customers shows the importance of tight security and that it is still an unsolved issue.

Another important point that has to get our attention is the standardization. Today there is no standard design and all the providers have their own solutions. This will create problems as the customers get stuck as soon as they choose a provider. Furthermore, it is hard to pull the information out from the Cloud and back into traditional solutions.

In addition, there are issues such as connectivity and server uptime. These problems are serious if they occur. Connections are relatively stable today and will probably be less of an issue in the future. Uptimes of the providers are high today and probably higher than most companies' internal solutions.

However, the Cloud will not be the only option available on the IT market. There will still be lagging computer users or companies, unwilling to switch to the Cloud technology; they will prefer to remain with the traditional software solutions, for various reasons. Moreover, there will also be cases of private or corporate users who will be adopting hybrid solutions, such as storing part of their data in the Cloud, while saving the other part via traditional software.

By the time Cloud Computing will reach its maturity as a product, personal computers will gradually lose their current status of data storage devices. Similar to the way households are buying electricity from the network company, private and corporate users will be buying the desired applications from the Cloud provider. They will only have to plug the cord from the network connection in their terminal and start working directly in the Cloud.
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11 Appendices

11.1 Appendix I: Interview Guide

Current state of market
- What is your view of the current status for Cloud Computing and SaaS? (A lot of unknown things, expensive techs and unreliable, or the market is accepting the product, dominant designs emerge. (Where do you currently see the SaaS and Cloud Computing market (i.e. innovation phase, early adopters)?)
- Do you think that the market is ready for adopting Cloud Computing at a large scale? If not, when do you estimate it will?
- How do the typical customer that use SaaS look like? (Several types, small/big, can be biased)
- How does the market for special software developed by the clients and third parties look like? (Software uploaded to the Cloud)
- How common is it that third parties develop and upload?
- Your main competitors and other actors?

Strategy
- What are your driving forces for migrating to SaaS?
- What is the main strength for your business?
- What do you perceive as your main risks?
- What is your target market? Who do you think are the most suitable early adopters to target?
- Which customers and customer needs do you concentrate on?
- Do you meet all your customers’ needs at the current state?
- What is your main focus in designing (developing) the Cloud platform and SaaS? Standard design, your own company’s concept?
- Do you buy the technology licenses needed for your Cloud and SaaS services or you develop in-house?
- Your marketing strategy? – i.e. how to convince end-users to shift to SaaS? (Customers are not interested in products themselves. They are only interested in what products will actually do for them and the problems that they will solve.)

Future
- Do you see any major threat for Cloud Computing in the future, i.e. some technology that might be better and hinder Cloud Computing from being fully adopted? (discontinuous technologies)
- Do you think that Cloud Computing platform will become very standardized in the future or there will still be several platforms to choose from?
- How will you ensure compatibility for third parties applications in the future?
- Will the client be locked in to your solution?

Finance
- What will be the main sources of income for your company regarding Cloud Computing and SaaS?
- How did/do you finance the development (e.g. platform?)
- What is your business model?