Saimaa University of Applied Sciences
Business Administration, Lappeenranta
Degree Programme in International Business Management
International Business Management

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# CLOUD COMPUTING, TIETO CLOUD SERVER MODEL

Master Thesis 2013

ABSTRACT
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Cloud computing, Tieto Cloud Server, 56 pages, 1 appendix
Saimaa University of Applied Sciences, Lappeenranta
Degree Programme in Business Administration, MBA
International Business Management
Master`s Thesis 2013
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The purpose of this study is to find out what is cloud computing. To be able to make wise decisions when moving to cloud or considering it, companies need to understand what cloud is consists of. Which model suits best to they company, what should be taken into account before moving to cloud, what is the cloud broker role and also SWOT analysis of cloud?

To be able to answer customer requirements and business demands, IT companies should develop and produce new service models. IT house Tieto has launched a new Cloud Server service to Finish markets on the 28th of November 2012. Tieto`s customer can now have server capacity via the new self-service tool and faster than ever before. Study explains what this innovative model is and how customers see the cloud in their business. The goal of this study is to get answers those issues mentioned above and also ask some customer experience from the Tieto Cloud Server model.

Theoretical part of the study is based on cloud computing related academic publications; including literature and articles, material from Tieto Intranet, academic discussion with Tieto professionals, Tieto live webcasts, internal interviews and phone interviews with the Tieto Cloud Server customers. A qualitative research with interviews was done to gather information on how customers want to proceed with cloud and cloud providers.

The research results indicate that cloud services are an increasing future trend. There are some risks and threats in the cloud, but the market situation and benefits offered by cloud services drives more customers into cloud.

In conclusion, the thesis results shows the importance of cloud as a new model of doing business, importance of product standardization and it also shows how important it is to create a new, innovative service models.

Keywords: cloud computing, Infrastructure as a Service, cloud server, cloud broker

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## 1 Introduction

Technology trends are changing how people work today: the cloud, mobile, social, and big data, are all impacting how businesses engage with their customers, partners and employees in order to better compete. Due to rapid growth, many companies are unable to handle their IT requirements even after having an in-house data centre. Corporate IT groups spend 70 to 80 % of their annual budgets on the operation and upkeep of datacentres and standard application systems like enterprise resource planning (ERP), customer relationship management (CRM) and other commonly packaged applications. For the most part of these activities do not provide meaningful differentiation in the marketplace nor do they provide a competitive advantage. By using cloud technologies to provide more of these basic services, companies have the opportunity to shift more of their annual IT budgets to spending on new systems and capabilities that will more directly relate to the success and growth of their business. (Hugos & Hulitzky 2011, p.103.) Infrastructure as a Service (IaaS) offering provides solid cost savings because the infrastructure associated with providing compute power, storage and networking does not need to be purchased and maintained by the customer anymore. In this study I analyse especially the IaaS model and its future prospects.

## 1.1 Background of the study

It is clear that the widespread implementation of cloud-based services is more than just hype. Cloud provides many options for the everyday computer user as well as large and small businesses. It opens up the world of computing to a broader range of uses and increases the ease of use by giving access through any internet connection. Customers are demanding faster, cheaper and more usable IT solutions all the time.

This ease might cause also some drawbacks. User has less control over who has access to his/her information and little to no knowledge of where it is stored. User also must be aware of the security risks of having data stored on the cloud. User should get knowledge about his options in terms of what type of cloud will be best for his needs, what type of provider will be most useful and what is the reputation and responsibilities of the providers which he/her is considering before signing up the contract.

To be able to compete in IT business, companies needs to have new innovative solutions to offer. Tieto has been answering to customers need by launching a new strongly automated Tieto Cloud Server model. This is an interesting, innovative model of service.

## 1.2 Structure of the study

The background, objectives, methods and the description of the research problem are introduced in chapter 1. The next two chapters are devoted to approaching the research problem theoretically. The goal is to understand why almost everyone doing the business is nowadays talking about cloud computing and moving their business to cloud. And are they forgetting some important issues when making the change to cloud services.

The basic concepts about cloud computing are introduced in Chapter 2. Third and fourth chapters contains cloud deployment models and cloud provider models. The fifth chapter presents SWOT analysis of cloud computing. There are mentioned benefits of the cloud and what opportunities there seem to be in the future. While there are many good things in cloud, there seems to be also risks and threats and things that customers fear about the cloud. These are also handled in Chapter 5. In Chapter 6 there are described how cloud are managed and introduced, and a new role which cloud has created, the Cloud service broker role is introduced.

In Chapter 7 there is a short introduction of the company called Tieto, where the author is working. There are also introduced Tieto`s cloud service strategy, old way of doing server ordering and then a new way, Tieto Cloud Server service.

After reviewing the theory chapters related to the subject, the eighth chapter concentrate on the empirical part. There is explained how the interviews were done, some basic information about interviewees and then an analysis of research findings. The conclusions of the study are presented in chapter nine.

## 1.3 The objective of the study

The objective of the study is to gain in-depth understanding about cloud computing and by interviewing customers to see what they want from cloud, to gain some

valuable information about how Tieto can improve cloud services. In traditional IT service delivery model, there is a large emphasis on procuring, maintaining and operating the necessary hardware and related infrastructure. In the cloud computing model, the primary focus is to create a more economic method for providing higher quality and faster services at a lower cost to the users. The cloud computing model enables CIOs, IT project managers and procurement officials to direct their attention to innovative service creation for the customers. But do customers have enough information from cloud computing, different service models, about cloud characteristics, benefits, threats etc.? What are the reasons and motivations behind companies moving to cloud? How do Tieto Cloud Server customers see the service? Have they received enough data and support?

This study aims to generate information that could be useful to people interested in cloud computing, people who work in IT business and companies who are planning to move them business to cloud. And most of all, important data from customers to Tieto Cloud Server model responsible and Tieto management level so that they are able to develop the product based on customer comments and needs.

## 1.4 Methods of the study

The theoretical framework of the research is based on existing material about cloud computing; by analysing books, articles and interviews from Internet, and having an academic discussions about cloud and Tieto cloud server model with Tieto specialists. Author also participated in an info session that was kept by Marketvisio for Tieto employees about cloud. These theories support the objective of the study and those questions that need to be answered. Theoretical part gives image of what cloud is and why it is topic of everybody's discussion at the moment.

The empirical research of the study is based on phone interviews for Tieto Cloud Server model customers. Data is then analysed using a qualitative method. Analysed data gives conclusion, what customer feels about cloud, why they choose cloud and what they want to have in the future from cloud. Qualitative method is selected because there is aim to get some valuable information from the customers about their future needs and prospects.

According to Woods in his book Qualitative Research (2006), main methods employed in qualitative research are observation, interviews, and documentary

analysis. Empirical part of this thesis is based on in-depth, open ended interviews and written documents. Woods continues and says that, a great deal of qualitative material comes from talking with people whether it is through formal interviews or casual conversations. If interviews are going to tap into the depths of reality of the situation and discover subjects' meanings and understandings, it is essential for the researcher:

- to develop empathy with interviewees and win their confidence;

- to be unobtrusive, in order not to impose one's own influence on the interviewee.

The best technique for this is the unstructured interview. This is an interview without any set format but in which the interviewer may have some key questions formulated in advance. The interviewer has a clear plan in mind regarding the focus and goal of the interview. Unstructured interviews allow questions based on the interviewee's responses and proceeds like a friendly, non-threatening conversation. (Eskola & Suoranta 2003, p. 86.)

Case study is made by interviewing four Tieto Cloud Server customers and those are Metsä Group, company X, company Y and Cargotec. Process of empirical part can be described as follows:

1. Discussions about Tieto Cloud Server model with Tieto Specialists.
2. Reading and analysing cloud and Tieto Cloud material.
3. Message sent to Tieto Cloud server customer responsible persons for asking their customer situation.
4. Phone interviews with customers. Interviews took approximately 70 minutes per each.
5. Data collection and analysis.

From analysed data will be collected similar aspects. Also data will be compared to each other and compared also with the data from the theory part of this study and main similarities and differences are pointed out and analysed.


# 2 Cloud computing

Cloud computing is a general term for anything that involves delivering hosted services over the Internet, for example networks, servers, storages, applications and services. These services are offered from data centers all over the world, which collectively are referred to as the "cloud." Cloud computing uses the Internet and central remote servers to maintain data and applications. It allows consumers and businesses to use applications without installation and access their personal files at any computer with Internet access. Since these services are often connected, users can share information between multiple systems and with other users. (Wikinvest; SATW 2012.)

A simple example of cloud computing are the following emails: Yahoo, Gmail and Hotmail. All you need is just an internet connection and you can start sending emails. The server and email management software is all on the cloud and is totally managed by the cloud service provider (Wikinvest). In the concept there is nothing new. As early as 1960s, computer timeshare services were selling excess capacity on mainframe computers. What is different about today's cloud model, however, is the scale, speed and volume at which excess capacity can be delivered to many companies from one datacentre. (Hugos & Hulitzky 2011, p.45.) Cloud computing is a reincarnation of the computing utility of the 1960s but is substantially more flexible and larger scale than the systems of the past, says Google executive and Internet guru Vince Cerf (Hugos & Hulitzky 2011, p.46).

Cloud computing is broken down into three segments: application, storage and connectivity. Each segment serves a different purpose and offers different products for businesses and individuals around the world. It leverages the Internet as a tool through which remote computers share memory, processing, network capacity, software and other IT services on-demand. (Nielsen 2013, p. 9.)

Below is the picture of simple structure cloud in which the cloud uses the several applications such as Amazon and Google apps for storing the data.
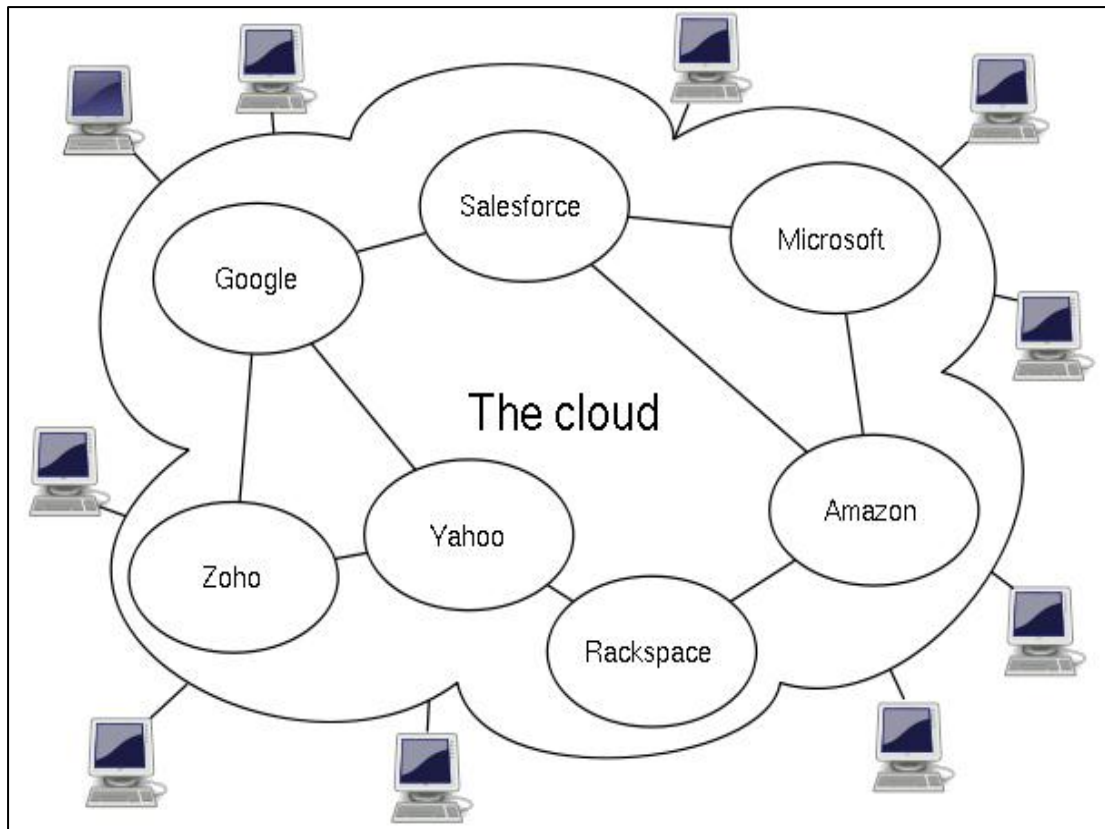
Figure 1. Structure of a cloud (http://www.defenseindustrydaily.com/defense-cloud-computing-06387/)

Cloud computing is characterized by five main attributes: on-demand self-service, extremely broad network access, resource pooling, unlimited and prompt scalability and measured service. (Nielsen 2013, p.10-11).

By employing cloud computing and its scalability possibility, organizations no longer have to invest a big amount of money in building up and maintaining their own IT infrastructure, as services and desired capabilities are available on demand and paid on a per-use basis. In this way, organizations no longer have to pay for internal resources that are not used, and can invest the money saved to drive innovation into their core business, rather than having money tied up in unused infrastructure.

The flexibility and scalability of cloud services enable the rapid adaptation of IT to changing business needs. Resources can be allocated as necessary. With efficient IT in place, an organization can focus on its core business and invest innovatively into research and development. (SATW 2012.)

# 3 Cloud deployment models

Cloud computing presents IT organizations with a fundamentally different model of operation, one that takes advantage of the maturity of web applications and networks and the rising interoperability of computing systems to provide IT services. Cloud providers specialize in particular applications and services, and this expertise allows them to efficiently manage upgrades and maintenance, backups, disaster recovery and failover functions. Cloud computing encourages IT organizations and providers to increase standardization of protocols and processes so that the many pieces of the cloud computing model can interoperate properly and efficiently. (Educause 2009.)

Cloud computing can be run in various deployment models. Which model is used depends on the user requirements and on market availability. Terms get mixed up frequently and many people are confusing them and use them inaccurately, so in next chapters it is described four main models and what advantages there might be in using them.

## 3.1 Public cloud

When most people speak of cloud computing, they generally mean public cloud. Public clouds are owned and operated by third parties and located in data centre's that operate outside of the companies that use them. Multiple companies share these resources; they are each assigned their own virtual computing capabilities based on a common set of physical resources. A public cloud provider such as Amazon or Google makes computing resources (for example processing power, memory or storage) publicly available over the Internet. Public clouds typically run on open source software to facilitate the movement of vast amounts of data. (Hugos & Hulitzky 2011, p.103; Nielsen 2013, p.10-17.)

### 3.2.1 Advantages of using public cloud

For obvious reasons, public cloud is bound to offer a several benefits for its users, which can be sensed by its ubiquitous demand. Some of the benefits are mentioned here in next sentences.

Public cloud can offer efficient storage and computing services, with an inexpensive price. Price can be lower since all the virtual resources whether application, hardware

or data, are covered by the service provider. It allows users an easy connectivity to servers and information sharing. In a public cloud environment, the user pays no bandwidth or hardware costs and setup is usually quick and easy. It assures appropriate use of resources to the companies as the users are required to pay only for the services they require. (Janssen.)

This model is said to be highly reliable, redundant and it is usable everywhere where is access to Internet. There is no need to install additional hardware's or software's. It sets the business people free from the hassles of buying, managing and maintaining all the virtual resources at their own end; the cloud server does it all.  Public cloud, in today's advanced workplace, empowers employees and enables them to become productive even when outside the office. (Samara 2012.)

## 3.2 Private cloud

Private clouds are owned and operated by a company or a cloud computing provider, but they are built for the sole use of a single company. Private clouds utilize the same technology as public clouds and they are often built to enable an individual company to maximize the use of its computing resources and be more responsive to company needs than was possible under the traditional IT operating model. There can be many situations; strategic, operational or perhaps cultural reason why company want to have their own, private cloud. (Lozano & Marks 2010, p. 37; Hugos & Hulitzky 2011, p.104.)

### 3.2.1 Advantages of using private cloud

Many industry analysts believe that private clouds will remain attractive also in the future since they can offset concerns about governance, data security and performance management. These private clouds can be built and operated as just what their name implies: a fully functional cloud that is owned, operated, and presumably restricted to a particular organization. Private clouds also offer large companies an inviting way to consolidate data centres, cut technical support and operations staff and increase server utilization. Base on the specific circumstances and business conditions, building a private cloud in the typical corporate heterogeneous environment, offers for example next advantages. (Hugos & Hulitzky 2011, p.106.)

It can enable IT organizations to leverage existing infrastructure and get cost effective use of their previous investments. By placing cloud computing inside the corporate data centre company can eliminate many of the issues that accompany the use of public clouds like data security, performance management and SLAs and concerns about regulatory compliance. Private clouds also have the potential of lower cost of use, since they don`t have a profit margin added onto their services. (Hugos & Hulitzky 2011, p.106.)

Until companies are familiar with this new operating model, some may feel that external cloud environments have too many unknowns and too much risk. Private clouds are good way to test maturity and reliability of the technology. (Hugos & Hulitzky 2011, p.106.)

## 3.3 Hybrid cloud

Hybrid clouds are combinations of multiple clouds that are both public and private. If an organization has varying needs regarding computational resources and also has both sensitive and non-sensitive applications, it can use a hybrid cloud to get the best of both worlds (www.techopedia.com). These clouds are created by individual customers to meet their specific needs. In practice, this is what the most robust enterprise cloud approaches will utilize. To create a hybrid cloud, companies need to put the infrastructure in place that will allow them to integrate public clouds with their private clouds while still maintaining security and performance management capabilities. This solves the security problems of public clouds and lets an organization take advantage of all that public cloud has to offer when it comes to general computing resources. IT vendor companies are making the technology that allows companies to do this. (Lozano & Marks 2010, p. 265; Hugos & Hulitzky 2011, p.104-106.)

## 3.4 Community Cloud

A community cloud is a cloud service model with multi-tenant infrastructure that is shared among several organizations from a specific group with common computing concerns. Such concerns might be related to regulatory compliance, such as audit

requirements, they can work on joint projects or research, may be related to performance requirements, such as hosting applications that require a quick response time or for example financial services. Anyhow these communities are having similar cloud requirements and their ultimate goal is to work together to achieve their business objectives.

Community cloud can be either on-premises or off-premises and can be governed by the participating organizations or by a third-party managed service provider. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized. (Rouse 2009; Kruk 2012.)

# 4 Choosing a cloud provider

In the immediate future, it is likely that many organizations of substantial size will wind up with a mixed IT environment incorporating both types of cloud along with non-cloud systems and applications (Nielsen 2013, p.11).

These services and their delivery are at the core of cloud computing. Each provider serves a specific function, giving users more or less control over their cloud depending on the type. User cloud needs will vary depending on how they intend to use the space and resources associated with the cloud. If it will be for personal home use, user will need a different cloud type and provider than if user will be using the cloud for a business.

There are three types of cloud service providers that can be subscribing to: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). These three types differ in the amount of control that user have over his information and conversely, how much user can expect his provider to do for user. (Lozano & Marks 2010, p. 42.) Next three chapters will introduce these three types of service models.

## 4.1 Software as a Service (SaaS)

The leading, early driver of more widespread adoption of cloud computing has been the Software as a Service delivery model (Hugos & Hulitzky 2011, p.47). With this model a SaaS provider gives user access to both resources and applications. SaaS makes it unnecessary for user to have a physical copy of software to install on his devices, it`s mobility and there is no location dependence. Customers access software over the Internet. It also makes easier to have the same software on all of user devices at once by accessing it on the cloud. It allows user to run the newest software without having the newest machine. (SATW 2012.)

The cloud providers manage the infrastructure and platforms on which the applications run. There is a rapid deployment and no maintenance needed to run the business functionalities. SaaS is sometimes referred to as "on-demand software" and is usually priced on a pay-per-use basis. SaaS providers generally price applications using a subscription fee. (SATW 2012.)

SaaS is used in a number of common business areas; customer relationship management, document management, service desk management etc. In a SaaS agreement, users have the least control over the cloud. (SATW 2012.)

## 4.2 Platform as a Service (PaaS)

A Platform as a service, PaaS system goes a level above the Software as a Service setup. It is a development environment where customer can design, develop, test, deploy and host applications in a provider`s computing environment. It is eliminating the need to find company-owned infrastructure for the development. This platform consists of infrastructure software and includes a database, middleware and development tools.

PaaS has several advantages for developers. With PaaS, operating system features can be changed and upgraded frequently. Geographically distributed development teams can work together on software development projects. Services can be obtained from diverse sources that cross international boundaries. Also initial and on-going costs can be reduced by the use of infrastructure services from a single vendor rather than maintaining multiple hardware facilities. (Hugos & Hulitzky 2011, p. 44; Rouse 2012.)

## 4.3 Infrastructure as a Service (IaaS)

IaaS is actually one of the first applications to which cloud computing was applied, it deals primarily with computational infrastructure. It is the most basic cloud-service model and providers of IaaS offer hardware, physical or more often virtual machines, and other resources such as images in a virtual-machine image-library, storage, firewalls, load balancers, IP addresses, virtual local area networks (VLANs) and software bundles. IaaS-cloud providers supply these resources on-demand from their large pools installed in data centres. The service provider owns the equipment and is responsible for housing, operating and maintaining it. There is no maintenance for setting up and running the infrastructure for the customer. IaaS characteristics are automated administrative tasks, dynamic scaling, platform virtualization and Internet connectivity. Cloud providers typically bill IaaS services on a utility computing basis: cost reflects the amount of resources allocated and consumed. There is a high scalability of the systems required based on customer actual needs. (Cebula & Huth 2011; Rouse 2012.) Author will concentrate in more depth on this IaaS model in coming chapters of this study.

Figure 2 ties up two previous chapters. In this picture, it is clearly shown, how cloud computing can be run in various deployment models and with IaaS, PaaS or SaaS model depending on customer needs.
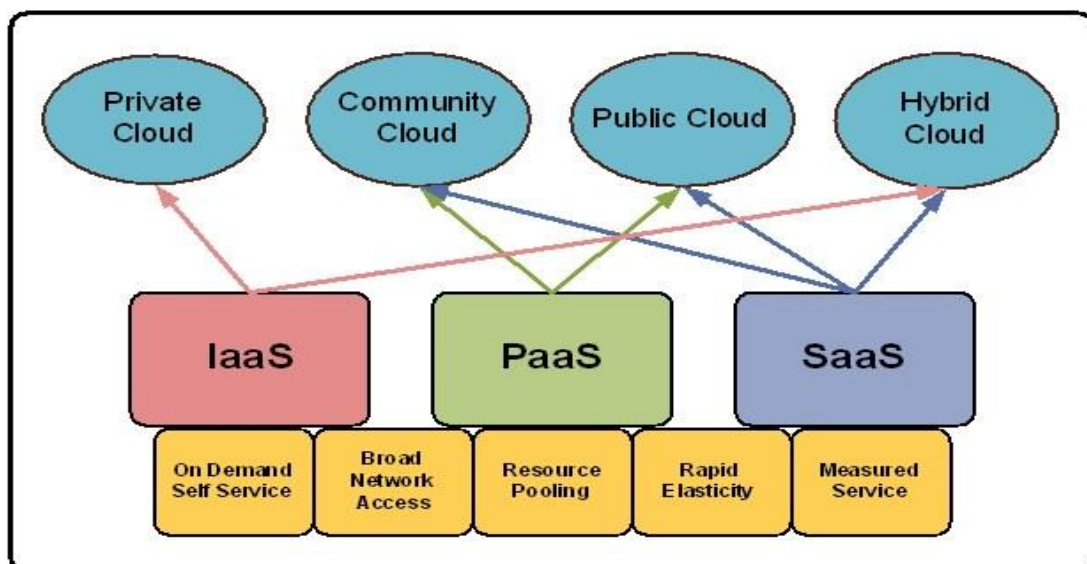


Figure 2. Cloud deployment models and providers
(http://dcvizcayno.wordpress.com/2012/04/13/cloud-computing-tips-for-financial-industry/ ).

When the cloud supplier is being selected, a smart way for the organization to proceed is with a pilot project. Preparing for a pilot project requires research and planning and ultimately helps the organization understand the specifics to identify in a suitable provider. Any move to the cloud should be based on a thorough situation/business analysis. (Hugos & Hulitzky 2011, p. 65.)

# 5 SWOT of cloud computing

The name says it: Strength, Weakness, Opportunity and Threat. A SWOT analysis is used in next two chapters to be able to analyze positive and negative issues inside of cloud computing (S-W) and negatives outside of it, in the external environment (O-T). Developing a full awareness of cloud computing can help with both strategic planning and decision making. The SWOT method was originally developed for business and industry, but it is equally useful in the work of community health and development, education and even personal growth. (Renault 2013.)

## 5.1 Benefits of cloud and cloud opportunities

Before cloud technology, the traditional corporate IT department struggled with self-sufficiency. Companies bought their own hardware and software, paid for expensive, custom-designed solutions that met special needs, and ran their own servers and internal networks. IT staffing requirements were high because companies needed professionals on-site to keep everything running. With the cloud, companies are encouraged to outsource the majority of their IT needs. Outside vendors would invest in hardware and software and make tech-based services available to companies over the Internet. Instead of paying for an in-house IT department, companies could buy tech services as they needed. (Techopedia 2013.) Cloud computing enables companies to make the shift from managing technology, to managing business processes and in process of making that shift, companies can reduce their fixed cost structure and redirect their money to activities more directly related to generating revenue. (Hugos & Hulitzky 2011, p.101.)

There are mentioned several key characteristics of cloud computing and those are at the same time its strengths. In contrast to traditional IT projects, cloud services can be provisioned with just a few hours' notice, rather than weeks or months. In this way, a business can respond rapidly to changes and keep the time-to-market as short as possible. Competitors in today`s business world emerge quickly and without

warning. *Agility* improves with users' ability to re-provision technological infrastructure resources. Instead of expending time and money on planning, vendor selection, solution set-up, pilots and deployment, organisations have standard services available within weeks for new services or even minutes when modifying existing services. (SATW 2012.)

*Cost* is claimed to be reduced and in a public cloud delivery model capital expenditure is converted to operational expenditure. In order to cope with unpredictability, companies need to reduce their fixed costs. What were once considered as normal amounts of fixed costs as a per cent of total revenue, are no longer a general rule. To survive, companies need to focus on achieving low break even points for their operations. If a company can break even at utilization rates of 50 % or less, it then has room to maneuver to meet the sudden and unexpected fluctuations in today's less predictable economy. The more the company can turn fixed costs into variable costs, the more flexibility it gains. (Hugos & Hulitzky 2011, p.153.) Features and processes that are similar in many markets are the first to be cloudified. This is lowering entering barriers, as infrastructure is typically provided by a third-party and does not need to be purchased for one-time or infrequent intensive computing tasks. Pricing on a utility computing basis is fine-grained with usage-based options and fewer IT skills are required for implementation. (SATW 2012.)

Cloud computing allows employees to be more *flexible*. The ability to simultaneously share documents and other files over the Internet can also help support both internal and external collaboration. Device and location independence; enable users to access systems using a web browser with a PC, mobile phone, notebook etc. regardless of their location. As infrastructure is off-site (typically provided by a third-party) and accessed via the Internet, users can connect from anywhere.  Larger cloud providers can offer *high availability* due to their ability to scale. Redundant interconnection and load balancing make it possible to satisfy high availability business requirements. (SATW 2012.)

*Virtualization* technology allows servers and storage devices to be shared and utilization to be increased. Applications can be easily migrated from one physical server to another. (SATW 2012.)

The presence of multiple tenants in the same cloud is certainly the case for nearly all public clouds. *Multitenancy* enables sharing of resources and costs across a large pool of users. It allows centralization of infrastructure in locations with lower costs,

such as real estate, electricity, etc. Peak-load capacity also increases. Utilization and efficiency improvements for systems that are often only 10–20% utilized. Services and capabilities that are non-core to the company are better and more cost-efficiently produced by entities for whom this activity is the primary business and who can survive through economies of scale. (SATW 2012.)

One of the key benefits of using cloud computing is its *scalability*. Cloud computing allows business easily upscale or downscale IT requirements as and when required. The cloud provider has mirrored systems that can be used both for disaster recovery, and for load balancing. By implementing a geographical separation of server rooms, it is possible to protect the cloud solution against even natural disasters. One of the biggest criticisms of traditional information technology infrastructures is that how hard it is to scale resources, either up or down. Because of the peak loads, companies need to over allocate they resources and this is causing low utilization. In order to achieve these higher utilizations (greater than 50%), it is crucial that the cloud is *elastic*. It should be easily and automatically scale up or down, with no effort required by the operational personnel at time of need and preferably minimal to no effort by the application developers in advance. (SATW 2012.)

*Security* could improve due to centralization of data, increased security-focused resources, etc., but concerns can persist about loss of control over certain sensitive data and the lack of security for stored kernels. Security is often as good as or better than other traditional systems, in part because providers are able to devote resources to solving security issues that many customers cannot afford. (SATW 2012.)

*Self-service IT infrastructure.* Cloud-computing service models are often self-service, even in internal models. Previously, you had to partner with IT to develop your application, provide an execution platform, and run it. Now, IT departments define use policies for automated platform and infrastructure services with line-of-business-owners developing applications on their own to meet those requirements. Also *maintenance of cloud* computing applications is easier, because they do not need to be installed on each user's computer and can be accessed from different places. (Greeger 2009.)

*Greenness in IT* business like the other business, shows bigger role now a days than earlier. Citizens and governments care increasingly about effects on the environment. For economic, political, and sociological reasons it makes sense to

minimize the environmental impact of any computing deployment. With the cloud, large IT capacity is gathered in fewer data centres, allowing better reuse of, for example, cooling energy. Infrastructure can be optimized for consumption. Servers are better utilised, as several virtual machines run on them and non-used servers can be awakened only when needed. (Lozano & Marks 2010, p. 40-41; Mingay 2010.)

Gartner's Cloud market research shows significant growth for cloud services in the near future. They say that it haven`t not even hit the toe yet, because at the moment users are still "early adopters" and it`s very much likely that larger mass of companies and users will follow. Figure 3 here is showing Gartner`s forecast for the cloud service market development within few years.



Figure 3. Cloud services market (Savo 2013).
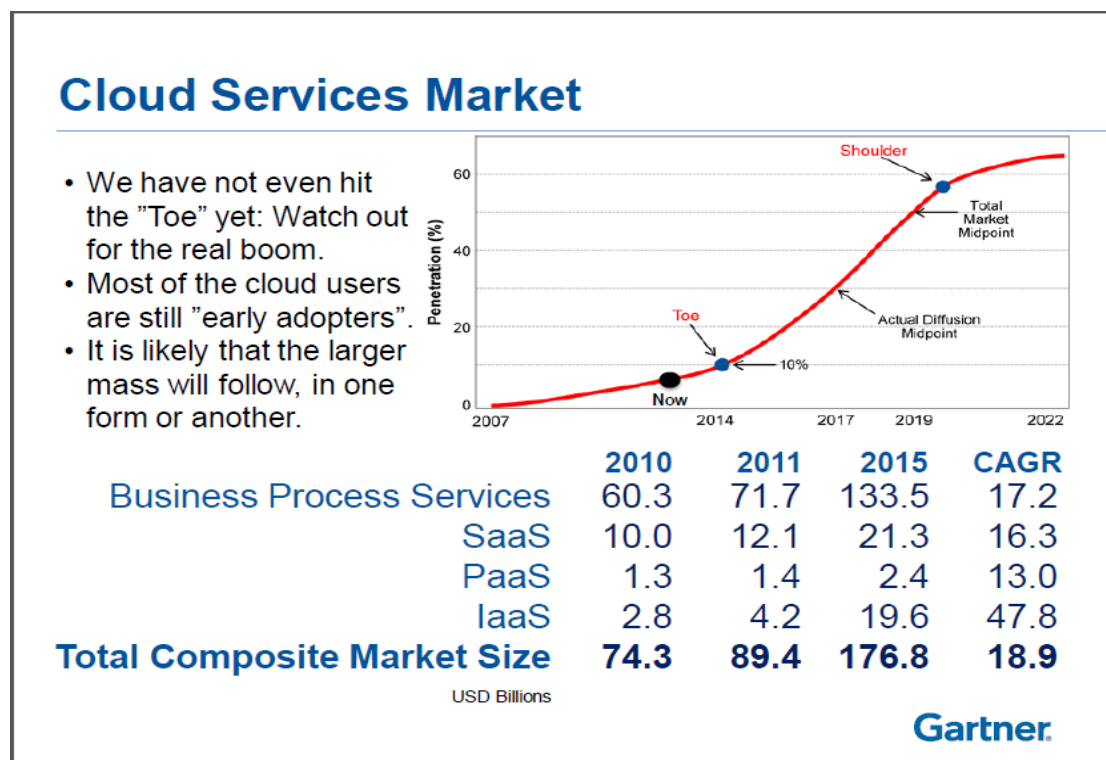
Market-Visio says in they research, that only in Finnish market, clouds services growth will be 20-22% per year. (Savo 2013.) Cloud computing is a broad and diverse phenomenon. Much of the business in cloud growth represents a transfer of traditional IT services to the new cloud model, but there is also scope for creation of substantial new businesses and revenue streams.

## 5.2 Weakness and threats involved in cloud computing

Cloud computing has become one of the best methods for companies who wants to revamp and enhance their IT infrastructures. But it is not an answer for every problem and there are certain issues and problems associated with cloud computing. These include performance, interoperability, data migration and transition from legacy systems and one of the most discussed risks in a public cloud has been security. Once your data enters the cloud, it can circulate through dozens, hundreds or even thousands of systems. This is truly frightening for anyone running applications that involve highly secure data such as financial information or corporate intelligence. The complexity of security is greatly increased when data is distributed over a wider area or greater number of devices and in multi-tenant systems that are being shared by unrelated users. Being entirely based on the Internet makes it vulnerable to hack attacks. But logically speaking, all the modern IT systems today are invariably connected to the Internet. So the level of vulnerability in cloud is much the same as everywhere else.

The following security issues are highlighted for the cloud computing vendors.
**Privileged access:** who decides about the hiring and management of the administrator?
**Data location:** does the cloud vender allow for any control over the location of data?
**Recovery:** what happens to the data in the case of disaster and does the vendor offers complete restoration and if so how long does that process take?
**Long term viability:** what happens to the data if the cloud vendor goes out of business is client's data returns and what format?
**Data availability:** Can the cloud vendor move all their clients data onto a different environment should the existing environment become compromised or unavailable?
**Continuity:** What happens when a cloud service provider is acquired by another company, or suffers an attack?

Compatibility with all the IT systems in a company is one concern. The problem arises out of the fact that the company would have to replace much of its existing IT infra in order to make the system compatible on the cloud. A very real problem known with cloud computing is the present lack of standardization in the system. This might have an effect on service quality what customer is receiving from the cloud provider. (Sengar & Soni & Sharma 2012; Wiswanathan 2013.)

Before stepping into the cloud, companies need to assess their risks associated with vendor log-in. Cloud computing can often use a systems architecture different than the one used by the traditional in-house systems, so once a system is moved to the cloud, it isn`t always a simple matter to bring it back in-house or move it to another cloud. Before selecting a cloud provider it is critical to evaluate the stability and longevity of that company. It is important to understand their pricing model and understand the likely on-going costs associated with using their applications or servers or platforms to run your business. (Hugos & Hulitzky 2011, p. 93.)

While cloud computing is not without risks and threats, it is very important to clarify these above mentioned issues when signing the contract with vendor. All these issues are manageable with some effort taken on the part of company involved. (Sengar et al. 2012; Wiswanathan 2013.).

One very important thing which needs to be remembered is that most of the companies still need on-premises hardware and an in-house IT staff. Sure, cloud services mean that company may have fewer servers to deal with and there's less for IT staff to do in support of the service, but that absolutely does not mean that company can put away all the servers and lay off the employees. This issue seems to be forgetting quite easily when talking about cloud. That is good news for the IT team but often comes as a shock to the business decision makers who thought the cloud meant they could outsource IT and shut down those costly datacentres. (Manes 2012.)

# 6 Cloud service management and broker role

This chapter is concentrating management of the cloud services and clarifying what the new role called cloud broker is all about. Cloud service management includes all of the service-related functions that are necessary for the management and operation of those services required by or proposed to cloud consumers. Moving parts of business to the cloud might sound simple, but it might not be that simple at all. Cloud services are a different set of technologies altogether, which might mean adopting a new way of thinking in terms of managing them. Working with many cloud service providers means also managing multiple relationships. So if company is trying to gain some cost savings or a more efficient way of working, they will have more success if they have a little help for ensuring that company get what they pay for.

Most companies are already negotiating multiple contracts with multiple cloud service providers. And multiple contracts mean multiple of everything; payments, passwords, data streams and providers to check up on. This leads to questions about how the company will make those services work together. Gartner has commented that combinations of cloud services will be too complex and untrustworthy for end consumers to handle their integration, and they predict that as cloud services are adopted, the ability to govern their use, performance and delivery will be provided by cloud service brokerages (Gartner 2009). "The future of cloud computing will be permeated with the notion of brokers negotiating relationships between providers of cloud services and the service customers," said L. Frank Kenney, Research Director at Gartner. In this context, a broker might be software, appliances, platforms or suites of technologies that enhance the base services available through the cloud. Enhancement will include managing access to these services, providing greater security or even creating completely new services (Gartner 2009.)

Next Figure 4, simplifying broker role in cloud service model.



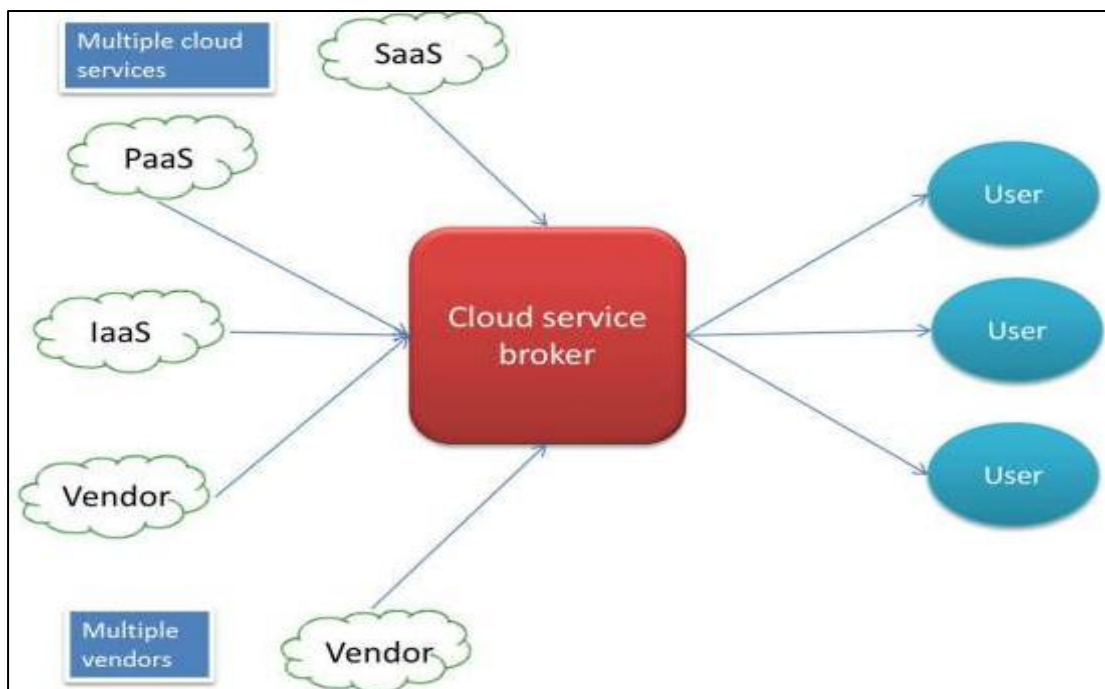Figure 4. Cloud service broker (http://researchismypassion.blogspot.fi/2012/04/cloud-service-brokerage.htm).

A cloud services brokerage is a third party company that adds value to cloud services on behalf of cloud service consumers. Their goal is to make the service more specific to a company, or to integrate or aggregate services, to enhance their security, or to

do anything which adds a significant layer of value (i.e. capabilities) to the original cloud services being offered. According to Gartner there are three roles for CBSs: aggregation, integration and customization (arbitrage).

Aggregator role pulls together multiple cloud services into one or more new services and provides them to the customer, acting as a reseller. These aggregation brokers will exist primarily in the cloud as service providers in their own right, forming a layer of service provisions that approximates the application layer in traditional computing. In aggregation-style brokerages, the services brokered are generally fixed and won't change frequently. (Gartner 2009.)

Integrator calls for the broker to link cloud services and on-premises systems. A customization role involves the tweaking of cloud services to meet the customer's needs or the creation of applications to run in the cloud setting. According to Gartner, intermediation brokerages and broker products that support them will exist in three places. First they may reside in the cloud at the service provider's location, allowing the provider to deliver a level of governance beyond the original service. Second, the broker may reside at the consumer's location and may allow local management or administration of service levels. Finally, the service broker may exist in the cloud as a service and in this situation; a true brokerage service business exists independent of the original service provider or the consumer. A viable CSB provider can make it less expensive, easier, safer and more productive for companies to navigate, integrate, consume and extend cloud services, particularly when they span multiple, diverse cloud services providers. (Gartner 2009.)

Service arbitrage is similar to service aggregation except that the services being aggregated are not fixed. Service arbitrage means a broker has the flexibility to choose services from multiple agencies. The cloud broker, for example, can use a credit-scoring service to measure and select an agency with the best score. (Badger et al. 2011.)

For some organizations, the role of the IT department may even shift to become a broker for use of cloud services. As IT staff loses systems and software to manage, brokerage becomes the natural evolution for their role in the organization. Gartner has forecasted that the annual IT expenditures on broker services will reach 100 billion US Dollars by the year 2014. (Moore 2012; Plummer 2012.)

# 7 Tieto and its cloud services

Tieto is the largest Nordic IT services company providing full life-cycle services for both private and public sectors. Tieto operates in more than 20 countries and are having about 17 000 experts working. Company was founded in 1968 and is listed on NASDAQ OMX Helsinki and Stockholm. Net sales in 2012 were EUR 137 million. (Tieto 2013.) The author has been working in Tieto since 2003.

After years in the works and 15 drafts, the National Institute of Standards and Technology`s (NIST) has published and The NIST Definition of Cloud Computing. And it is said as follows: "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"(Grance & Mell 2011.)

Since 1989, Tieto has successfully operated real-time, business-critical services that today qualify as 'cloud services'. Tieto defines its Cloud Service offerings as follows: Supply of secure capacity, platforms, applications and business services on demand, with provisioning and consumption that apply a self-service mode. Tieto has one of the strictest and most demanding definitions among of cloud service providers. Tieto`s definition is consisting following sentences: Self-service customers can provision the service themselves. Tieto is having consumption-based pricing. Consumption is metered by use and billing is on a pay-as-you-go basis, according to the amount consumed. Users can access the systems via a well-known, widely available connectivity technology. Customers buy a ready-to-use service (they do not need to own anything enabling the service). The user interface hides the implementation details and provides the end-user services. Tieto is offering a multi-tenant approach. Infrastructure, platforms, or software are shared among customers, who remain isolated from each other, allowing utilisation and efficiency improvements. The service is elastic; scale capacity can be scaled dynamically up and down according to customer need. Tieto's differentiating attribute is offering of enterprise-ready cloud solutions for customers' business needs. Tieto makes it easy and safe for its customers to move to the cloud, by offering: integration capabilities, consultancy capabilities, an abundance of channels (such as mobile options), security, confidentiality and integrity of data and applications, localised data storage, documented SLAs and liabilities, service evolution and fast deployment. (Tieto 2012.)

## 7.1 Tieto's cloud services strategy

According to several leading analyst companies the worldwide IT services market is facing a major shift during the present decade. The big picture illustrates the market trends and a major market shift in IT and outsourcing; moving from traditional offerings and legacy systems towards cloud based services. The forecast shows that approximately 40% of the IT services will be new, emerging type of cloud based services and offerings. (Tieto 2013.)

Tieto's cloud services vision is to become the leading cloud services integrator in the near future and gain the competitive advantage being thought of as the leader. Building cloud service capabilities enables Tieto to offer an additional delivery model and to strengthen position as a trusted partner to its customers. (Tieto Cloud Offerings.)

For today's CIOs and technology leaders, the cloud presents an opportunity to rethink the role IT plays in defining a business' strategy. Because of its power to fundamentally change how businesses operate and compete, the cloud is a game changer for the enterprise. Tieto sees the cloud as a logical evolution of IT services. The IT capabilities and the customer needs already exist. From a business perspective, however, the cloud is a revolution. Customers are changing their procurement strategies, supplier lock-in is decreasing, vendors' business models are changing and the ways in which sales are performed and contracts written are changing. (Tieto Cloud Offerings.)

Tieto already has leading and mature cloud services and is investing in expanding this portfolio and the associated capabilities. The investments include improving cloud competencies, new cloud-capable data centres and involvement in cloud related programmes and organisations. Tieto has created frameworks that foster reuse of components and approaches to support rapid supply of proven capabilities to customers. With cloud service, its business target is to increase revenue, reduce costs through common infrastructure, asset reusability and full automation where ever it is possible. (Tieto Cloud Offerings.)

Tieto's goal is to support customers in deciding whether and how to consider cloud services, providing cloud services and enabling the use of other clouds (such as Microsoft's Azure, Google, or Amazon) and integrating these with the customer's own systems. Tieto offers following types of services: cloud consultancy services, cloud

integration services, BPaaS, SaaS, PaaS, and IaaS. It responds to customer needs for all types of cloud service deployment, including, public clouds, private clouds, shared private clouds and hybrid clouds. (Tieto Cloud Offerings.)

For Tieto, the cloud will be an integral component of IT service delivery. The evolution in business and IT is a never-ending, continuous process. Competition drives innovation for gaining new business advantages. After innovation, desires for cost reductions and efficiency improvements drive standardisation, inevitably leading to commoditisation. Today, large numbers of business processes and tools are standardised and many companies are seeking opportunities to reduce internal costs as competition decrease margins, adopt standardisation and best practice for processes and capabilities that are not delivering unique advantages, reserve a larger proportion of the IT budget for truly business-critical, business-specific, or advantageous projects or services. They try to find easier, faster and less expensive ways to enter new markets and try to free costly staff from recurring daily tasks to focus more on core business. This is the background for the emergence of IT cloud services. (Tieto Cloud Offerings.)

The challenge for companies today is to learn enough to navigate comfortably between the opportunities available. Companies need to make the right decisions regarding which capabilities to keep in-house, which to outsource on dedicated platforms and which they might deploy in the cloud. Companies need to decide which processes are company-specific, which are or can be standardised and outsourced, and which data must be remain within company because of the internal or national jurisdiction. (Tieto User Communities.)

## 7.2 Old model for capacity ordering

Clouds have changed the way people think about IT infrastructure management. Providers of software-based services are now able to outsource the operation of the hardware platforms required by those services. Speed and simplicity are the key features that will take cloud further.

Different types of cloud services have been available on the market for some years now. The market penetration has been growing steadily and cloud has taken share from the legacy systems, but still the majority of the capacity action takes place in the

traditional managed services delivery model. Unfortunately, in the old model the positive customer experience has become almost non-existent. It is not meeting today´s efficiency and speed requirements. The reason for this is that the services have not been developed end-to-end and therefore they have not met today´s business requirements. To be able to add value to business operations and processes requires an understanding of complex interdependencies between processes, applications and services. This means that the market craves innovative thinking that can effectively and successfully challenge the old school capacity service problematic. (Tieto, 2013.)

These pain points below are familiar to all capacity users:

**Ordering process** = too complicated. If ordering process of production or testing servers have several steps and take the majority of IT manager´s time.  It focuses on the routine and can never be effective.

**Delivery** = too slow. If the server order process takes from 2-6 weeks and a plenty of specifications, paperwork and uncertain delivery time and most likely serious delays, it simply cannot support the business targets.

**Integration** = simply missing. If the new capacity cannot be integrated to the customer´s existing networks it will be just a stand-alone capacity. It will most likely cause problems at some time needing separate actions, monitoring and plenty of IT management time.

**Care** = missing. If there´s nobody to assist when there´s a technical problem. This will mean in business critical systems a potential business loss and who is going to solve the capacity problem inside the organization in this case.

**Management & billing** = too costly. If managing the billing process of capacity bought from several sources will require dedicated staff to manage, it means unnecessary and hidden administrative costs and that always deduct the IT development budget. (Tieto, 2013.)


## 7.3 New model of Tieto cloud

Taking an active role in cloud services and digging deeper into customer needs has given a solid insight towards cloud service development. In the end of 2011 the Tieto started a dedicated service development program to solve the pain points that customers are facing with capacity services. It is self-evident that customers are looking for flexible, dynamic and cost efficient infrastructure services instead of

having own hardware or fixed term "lease like" capacity contracts. At the same time customers require advanced security and business continuity features. (Tieto 2013.) It is important for suppliers to rethink and innovate and try to make complex issues easier. The future capacity services will be clearly business need driven and consumption based. In addition to that, companies want to get the best out of ecosystems and seamless integration of legacy and public/private clouds. This universal trend is visible across the organization levels, covering all roles from IT management to project managers, from business process owners to the board room. (Tieto 2013.)

Tieto has launched a new model for customers to order servers capacity. Tieto Cloud Server service introduces a new way of thinking in cloud capacity services. It is part of the Tieto's Infrastructure as a Service (IaaS) offering. It provides server services from the supplier`s cloud. Servers can be used for general purpose computing, storage and backup needs. (Tieto 2013.)

Original idea was already invented in 2000, but at that time technology was still limiting the implementation. Tieto`s Technical Director did not bury his innovative idea and he started development work again in August 2011 with his team (1+6 persons). December 2011 they get the circuit diagram ready and Technical Director gets the confirmation that it could be possible to build cloud server model with today`s technology. Basic functionalities were ready in August 2012. Tieto Cloud Server was launched in Finland to public 28th of November 2012. Now it has been launched in Sweden and Norway markets and it has received a warm welcome from the audience in both countries. In Tieto`s CEO live webcast 25[th] of April 2013, he said that: "We are expected strong growth for Tieto Cloud Server model. Over 5% of Tieto`s servers move to cloud, based on Q1 agreements. And by year-end, the share is expected to increase 20%."

With next sentences there are introduced Tieto Cloud server model. It combines the best features of public and private cloud and offers virtualization benefits to the fullest. The service is a well-mixed and matched entity of several different technologies, 13 altogether. It has a proven architecture and network solutions behind it. In Figure 5, there is shown Tieto cloud server architecture.
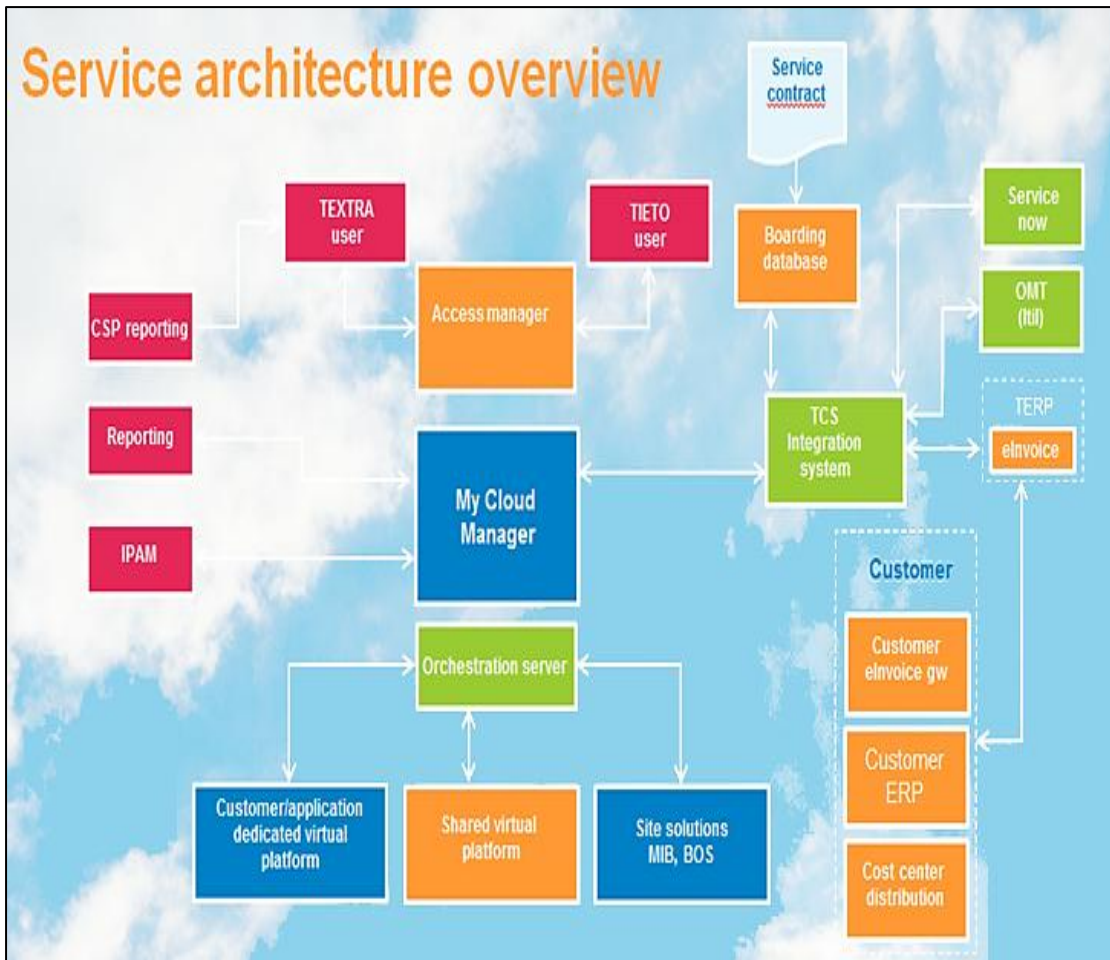
Figure 5. Tieto Cloud Server service architecture (Tieto Cloud Server Sales Presentation, 2012).

Tieto Cloud Servers uses the Tieto IP Address management (TIPAM) system for IP addresses management. Customers are migrated to IPAM in cloud server boarding phase. Portal is accessible through Internet via a WEB browser by using SSL encryption. User is authenticated at the access gateway by a username, password and security certificate. (Tieto 2013.)

It is fully scalable and therefore fits all types of users and all situations, by addressing constantly changing business requirements. This is very important as the customers represent a wide variety of businesses, operations, sizes, locations, missions and heritage. (Tieto 2013.)

Tieto cloud server offers a new approach to the following service elements. It provides template based automated capacity provisioning service for the customer. Ready-made, standardized templates enable faster and more effective

implementation processes. The service also offers option to customize the existing templates according to customer requirements. Self-service is one of the key convenience factors for the users. Tieto cloud server provides easy-to-use self-service portal for capacity ordering, change- and decommissioning functions. It also provides monitoring, management, usage- and cost reports, security and data protection services for capacity as one package. (Tieto 2013.)

Service includes comprehensive care service packages up to 24/7 support and management according to ITIL. Care services will ensure that the availability, performance and disaster recovery for the server systems respect the Service Level Agreement (SLA). There are six service packages from which to choose, these are reflecting different SLA levels: Iron, Copper, Bronze, Silver, Gold and Platinum. Service packages include a ready-made set of capabilities: availability, site solution, monitoring, backup, incident management, virus protection, OS patching, service requests, service desk and boot/recovery priority. (Tieto 2013.)

Figure 6 is showing the structure of Tieto cloud server service. There is mentioned in the picture cloud server platform and on-site platforms and different care level packages, from which customer can choose the most suitable one based on their company needs.



| User interface | Self-service portal | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| Care packages | Iron | Copper | Bronze | Silver | Gold | Platinum |

**Tieto Cloud Server Platform in Tieto Data Centers**

| Processing capacity | Memory | Scalable Storage |
| --- | --- | --- |
| 1-8vCPU | 1-512GB | 1 Gb - n Tb |

**On-site platforms**

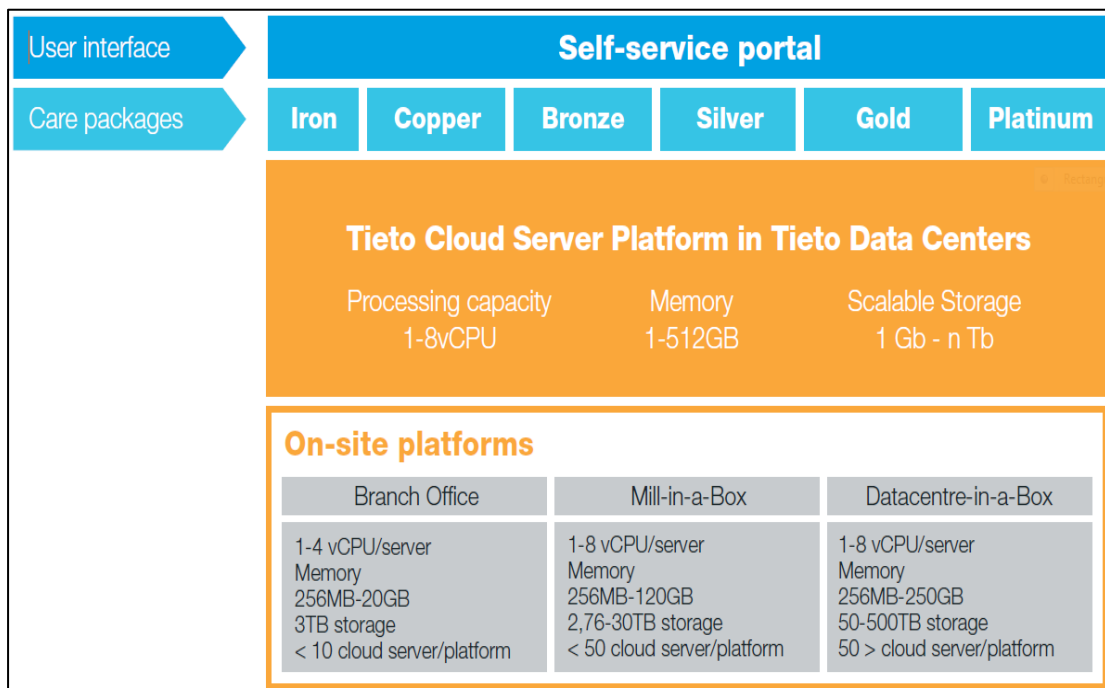| Branch Office | Mill-in-a-Box | Datacentre-in-a-Box |
| --- | --- | --- |
| 1-4 vCPU/server<br>Memory<br>256MB-20GB<br>3TB storage<br>< 10 cloud server/platform | 1-8 vCPU/server<br>Memory<br>256MB-120GB<br>2,76-30TB storage<br>< 50 cloud server/platform | 1-8 vCPU/server<br>Memory<br>256MB-250GB<br>50-500TB storage<br>50 > cloud server/platform |

Figure 6. Tieto Cloud Server service description (Tieto Cloud Server Sales Presentation, 2012).

Most customers appreciate having their data stored close to their operations and to be available everywhere. Tieto cloud server services are provided from Tieto's modern and energy efficient data centres in Finland and Sweden. Customer can select between a single site, dual site or dual site including fast disaster recovery. The primary production pod is located in Finland. All data centres are connected together with fault tolerant and at least doubled network connections. Backed up data is located in two separate disk pools located in different datacentres for the first 30 days. After 30 days it is moved to the automated tape library. (Tieto 2013.)

Cloud server billing represents a new type of transparency and simplicity. It is based on capacity, service level and add-on services for each capacity delivery. The billing record is created when the order is created in the system. The billing period is one day, so it is possible to order capacity for just one day usage. Customer may enter relevant codes per delivery via self-service portal to business service. That information can be handled in the integration layer or directly in ERP to be used in cost distribution. (Tieto 2013.)

Tieto cloud server boarding service is a standardized and productized way to execute implementation project. The boarding service contains the briefing, data collection phase, network design phase, configuration training and go-live activities. The system will be configured to produce standardized configurations based on templates. (Tieto 2013.)

Cloud server offering has a continuous development program and new features and functionalities will be introduced regularly according to service development roadmap in the future. Tieto Cloud Server Architect commented that in near future there will be available other independent software vendors appliances from this service; like development framework appliances, firewall appliances, security appliances, middleware software appliances etc. This self-service portal model supports add-ons ordering and new add-ons will be introduced to customers quite soon. Also there is an import process implementation on going. This means those already existing servers transfer to Tieto cloud. This will harmonize invoicing and contract issues.

There are certain benefits with Tieto cloud server process, which Tieto`s competitors doesn`t have yet. Biggest benefit is the delivery time. Tieto is having fastest delivery in the market at the moment. New server is up and running in few minutes after customer server order template is received. Delivery is fully automated. Server

capacity can be scaled up and down according to customer need. Peak loads can easily be accommodated and also rapid growth can be handled without problems (scalability). Unused capacities can be released immediately and single-use or rarely used applications become affordable.

In Figure 7 there are collected together some main benefits of Tieto cloud server service for the users. These all are mentioned in text at the top and below the picture.



**Tieto Cloud Server, fastest ever…**

**FASTEST DELIVERY**
• Server is up and running in 3 minutes
• Fully automated delivery

**SIMPLEST ORDER PROCESS**
• Simple and easy self-service portal
• Capacity change in minutes

**ADVANCED SECURITY**
• Secured and energy efficient datacenters
• Secured console access from anywhere

**AVAILABILITY**
• Server is available in existing networks
• eInvoicing, integrated and automated billing

**EASIEST MANAGEMENT**
• Comprehensive set of care service packages
• Simple service management

Figure 7. Fastest service in the market.

Order process is very simple with easy self-service portal. Server order can be completed in few minutes and capacity change happens also within minutes. This is carefree service with e-invoicing. There is integrated and automatic billing, this has improved billing quality. One big plus is also advanced security of data close to Finnish and Swedish customers. There is secured and energy efficient datacentres and secured console access from anywhere. (Tieto 2013.)

Tieto Cloud Server supports the following operating systems families: Microsoft Windows, Suse linux and RedHat Linux. (Tieto 2013).

**7.4 Concerns and responses about the cloud and Tieto solution**

Here are mentioned some concerns that customers have brought up in discussion with them. First issue to be mentioned is security. *"Will my data be safe?"* Tieto has customers in health care, finance, and other industries that trust us to handle and store their data. In many cases, data and business continuity is greatly enhanced when one utilising Tieto's underground data centres and redundant sites. Tieto sites and processes are security-certified. Data, whether in transition or at rest, will remain isolated from other customers. Next concern is localisation of data. *"I want control over my data".* A similar question arises in traditional outsourcing, but global cloud services add complexity. Tieto offers local data storage in countries with Tieto data centres and also can provide integration with local or global cloud providers.

Next one is control over functionality. *"How can I steer and influence the needed functions?"* Tieto cloud services are continuously updated in line with the platform and software versions in use. Tieto's service governance model ensures that customer viewpoints are captured in the service evolution. Standardisation is in the nature of cloud services. Cloud services are configurable, allowing some customisation, but when very specific functions are needed, maybe the cloud is not the answer.  And the last bigger concern is opportunity to go back. *"What support is there for migration to another cloud, or back home?"* Company has many years of experience of customer transition to and from Tieto service delivery and applies proven models to enable efficient, high-quality transition projects. While standards do not yet exist, Tieto actively monitors the work of various cloud standardisation bodies. (Tieto 2013.)


# 8 Interviews and research analysis

Phone interviews were made to be able to find out customers opinions about cloud and Tieto Cloud Server model.


**8.1 Interview**

Three of the telephone interviews were made in Finnish and one interview in English. Author was written answers down and for avoiding misunderstandings all the questions and answers were gone through once more in the end of the interview. This was ensuring common understanding of the interviewee's answers between author and interviewees. Author was not giving any answer choices to interviewees; they were answered to authors' questions in their own words. Interviews were lasting from 60 minutes to 75 minutes. Author has analyzed the answers and translated them in English.

All these interviewed companies were representing different variety of business. These four companies were selected because they have already signed contracts with Tieto about Tieto Cloud Server service. Interviews were made under following topics: Start point, some basic knowledge about the company and their IT model at the moment. What they are expecting from the cloud? Then it was discussed about cloud benefits and have they already gained something from the cloud. Have they faced problems and receive enough information. Then there are some Tieto specific questions about data storing and Tieto Cloud Server self-service portal. Improvement ideas were discussed next. There are a lot of vendors in the market and application/software compatibility is asked and are these companies seeing any risk factors in cloud moving. When asking about the first 3 cloud services that came to mind, one goal was to found out if Tieto was in the top 3. Last two topics were very interesting and important for this study; ideal cloud server provider and what kind of cloud services customer wish to have and the other one was company future prospects. The theme interview guide is included in the appendices of this study. However, in practice, the interviews took more a form of informal discussions. This was the original idea, so the interviews went as expected.

## 8.2 Research analysis

In this chapter, there is some background information from the companies that were interviewed. Main data of interviewed companies is also added to table 1. First two questions that were asked were concerning the previous used server capacity ordering model and what company cloud service situation at the moment is. After this, data from the rest of the interviews are analyzed. Analysis includes answers and comments of respondents during the interview.

| | |
|---|---|
| **Case 1** | • Finnish pension related insurance company<br>• 150 employees<br>• IT is handled in traditional way; own small data centre<br>• Interviewee was company's IT Development Manager |
| **Case 2;**<br>**Metsä Group** | • Big international forest company<br>• 11 500 employees and production in 9 and sales offices in 26 countries.<br>• Interviewee was Mr Tapio Nuutinen, Vice President, Delivery<br>• Company is using cloud for server capacity ordering, travel expense handling and e-mail migration to cloud is ongoing at the moment. Other functions company will continue still managing with traditional model. |
| **Case3** | • International insurance company<br>• 6200 employees in Nordic and Baltic countries<br>• Interviewee was company's Service Manager, from Sweden<br>• Earlier model which they have been using is not a cloud solution. They don`t have own data center, all they servers are on Tieto premises. |
| **Case 4;**<br>**Cargotec** | • Cargotec is cargo handling solution provider<br>• They have a global presence and local services in more than 750 sales and service locations in more than 120 countries. They operate with 10500 employees.<br>• Interviewee was Mr Hannu Rissanen, Vice President of IM Services<br>• Own dedicated private cloud model in use with hundreds of servers; environment is hosted by Tieto and managed by Cargotec ICT. Company is now having 36 servers in Tieto Cloud. |

Table 1. Tieto Cloud customer cases.

**Case 1**; Finnish pension related insurance company with 150 employees. Interviewee was company's IT Development Manager. IT is handled in very traditional way; customer is having they own data center with small IT department (1+4 persons). They are having they own servers and they are hosting infra by themselves.

Contract with Tieto Cloud was written 6.3.2013. Customer moves to Tieto Cloud their pension insurance system and they are now having a test environment in use. This will be moved to production by end of 2013. New project has also started in the beginning of the May and this will be also tested and hopefully move to production during the spring 2014.

**Case 2**; Big international forest company whose business areas are wood supply, wood products, paperboard and paper industry, tissue and cooking paper industry and pulp industry. They have 11 500 employees and production in nine and sales offices in 26 countries. Net sales in year 2012 were 5 EUR billion. This company is Metsä Group and interviewee was Mr Tapio Nuutinen, Vice President, Delivery.

Company is using cloud now for server capacity ordering, travel expense handling and e-mail migration to cloud is ongoing at the moment. Other functions company will continue still managing with traditional model. Tieto Cloud Server contract was assigned December 21th, 2012.

**Case 3**; Third company represents international insurance sector. Company has 6200 employees in Nordic and Baltic countries. Interviewee was company's Service Manager, from Sweden. Earlier model which they have been using is not a cloud solution. They don`t have own data center, all they servers are on Tieto premises. Migration project to cloud with these old servers is ongoing. Contract with Tieto cloud Server model was assigned April 28[th,] 2013.

**Case 4**; Fourth case is Cargotec. Cargotec is cargo handling solution provider. They improve the efficiency of global cargo flows handling. They have a global presence and local services in more than 750 sales and service locations in more than 120 countries. They operate with 10500 employees. A net sale in year 2012 was 3.3 billion EUR. Interviewee was Mr Hannu Rissanen, Vice President of IM Services.

Cargotec were having earlier they own dedicated private cloud model in use with hundreds of servers; environment is hosted by Tieto and managed by Cargotec ICT. Contract with Tieto Cloud Server was assigned 25.2.2013. Company is now having 36 servers in Tieto Cloud. Migration process concerning the rest of the servers is ongoing.

After background information was discussed, author was starting discussion with following topics:

**Company expectations and what benefits they think to gain from the cloud?**

Benefits that users may gain from the cloud are mentioned in this study chapter 5.1. The purpose of these questions was to see that these customers are giving the same kind of reasons why cloud is interesting and what kind of benefits they think to gain from using/moving their business to the cloud.

Answers from the customers were similar to those the found in the theoretical part of the study including flexibility, scalability, pricing, cost savings, easiness of cloud, good for testing and development work. Here is gathered main point of the answers:

- *"There are still a lot of open questions in the air, but we have big expectations from cloud model. Company is having positive feelings about cloud in general."*
- *"Cloud is used when there is some point to use it; hype has not affected to decision making."*
- *"Expectations are in pricing; costs are lower."*
- *"Flexibility; server stops and startups are easy."*
- *"Business is changing rapidly and the infrastructure must be able to meet the challenge. Scalability is the biggest benefit customer sees in cloud service. Possibilities to add quickly new server capacity or also lower it rapidly if needed."*
- *"There has been big challenge earlier with infra capacity for smaller companies. They need to be able to provide the same service than the bigger competitors are. This requires a lot from infra capacity, but costs cannot be as much as the larger companies can pay."*
- *"Cloud is easy; easy to order capacity and easy to get rid of it. Also availability is important, you can sign in everywhere in where Internet is working. Very good for testing and product development work, on/off whenever it`s needed. Version management is easy."*
- *"Private, dedicated environment management required too much resource from the customer side. Tieto Cloud Server removed this problem."*
- *"Scalability and flexibility. Correct amount of capacity in use. Fast deployment for project and development platforms."*

**Have your expectations been filled?**

This question is indicating how well Tieto has been successful with cloud. Mostly it was discussed still in Tieto Cloud Server test environment and integration phases of the projects.

Customers seem to be quite satisfied. Test environment is working well and also those environments which have already migrated. Although there has been some challenges in migration phase of the projects. The interviewees expressed their answers as follows:

- *"Tieto Cloud Server test environment has been working fine and plan is to move to production soon."*
- *"Yes and no, integration is not as easy as the promises were. In integration support model has been difficult. User authentication password harmonization, this cannot be irrelative issue. Cloud is fitting better in small size companies than the bigger ones."*
- *"It is standardized solution and expectations are high and feeling is very trustful."*
- *"Already migrated environments are working well. Performance (compared earlier model) has been improved."*

**Have you had any problems related to cloud?**

Purpose of this question was to hear if the customers were facing any problems related to cloud and if yes, what kind of problems. For knowing these problems, would be very useful information in the future projects and migrations.

There have not been any server related problems. Problems have occurred during the evaluation and migration phases. Interviewees commented as follows:

- *"No server related problems. There have been some challenges with routing and telecommunication; long opening times."*
- *"Support model for integration should be better."*
- *"Quite many problems during the evaluation, these are now solved. Support was very good. Main reason was that portal was still in beta version, no problems with the servers itself."*
- *"There have been problems in migration phase, but these are already solved and concept and tools are working. Deployment schedules of the new servers are now fast."*

**Have you received enough information from the cloud? From Tieto and/or other sources?**

This question was asked, because in several literature sources in theoretic part of the study were mentioned, that there are a lack of cloud information. Also thesis picture 9 is showing the same problem. Lack of knowledge seems to be the biggest barrier for cloud entering. Author liked to hear how these customers feel about this issue and had they got enough information with Tieto Cloud Server service.

All the interviewees were giving the same answer and they said that they have not suffered the lack of information. All felt that they have received enough information from cloud in general and also enough information from Tieto Cloud Server model. Customers commented on this question as follows:

- *"Customer has received enough information."*
- *"Customer is also hoping that they will keep up to date with information about new solutions and possibilities Tieto has offer them in the future."*
- *"Yes, enough information has been received. Contract negotiation was in suitable time and enough information from cloud from Tieto was received. Also enough information from other sources has been received."*
- *"Information has been received enough. Customer company has had own technical expertise in high level about cloud and this has also eased the understanding and transition to cloud. Good technical level support/knowledge received from Tieto."*

**Is there a difference for your company in where data is stored?**
(Finland/Sweden/or some other countries)

Tieto Cloud Server services are provided from Tieto's data centres in Finland and Sweden and by asking this question from the customer author wanted to see if this is an important issue to the customers.

It turned to be very important question for all the companies who were interviewed. They all stated that it is important to know in where the data is stored and it was also mentioned that there are company regulations and legislation issues who says in what countries data can be stored. Interviewees commented as follows:

- *"Yes it is very important issue. Customer is very happy to know that their data are stored in Finland. It can be also in some other countries, but never outside of EU."*
- *"Yes it`s important. Outside of EU is not allowed."*
- *"Yes, it is important. At this moment, you need to know where the data is stored."*
- *"Yes, certain information needs to be inside EU."*

## Have you already used Tieto Cloud Server self-service portal? Do you see that it could have an effect on your organizational structure?

Tieto Cloud Server model provides a quite easy to use self-service portal for capacity ordering, change- and decommissioning functions. This self-service portal is mostly in test use at the moment, so there were not so many comments concerning about its usage, but customers sees that it adds value to the service. They did not see that it could affect to their organizational structure at this point. They commented as follows:

- *"Have tested it and it seems to be clear and easy to use. Customer don`t believe self-service portal and Tieto Cloud server model have an effect on such a small IT organization."*
- *"Self-service portal is in test use, interviewee has not been using it. Test environments are clear improvement and value-added to customer."*
- *"It is in test use. No big effect, Tieto is already handling big part of services. Over the time there might be some."*
- *"Portal is in use. It is a very good tool; easy to use and the possibility of errors, done by the users, is minimized."*

## Do you have any improvement ideas to Tieto? What kind of add-ons or appliances you wish to order via self-service tool in the future?

It is always important to hear what customers wish to have, so that supplier is able to serve the customer better. This could be valuable information for the Tieto Cloud Server development team.

Most important issues for the future seem to be licensing and license management related issues, pricing should stay in competitive level without separate negotiation,

future roadmap was seen as a very important issue to have and to keeping customers up to date with new possibilities/development ideas of the cloud. Interviewees commented as follows:

- *"PCI standard (Payment Card Industry)."*
- *"Software version and server capacity should stay up to date. Cost effectiveness should remain in at a competitive level without the constant negotiation."*
- *"Additional software should also be ordered via tool. How clouds will development in the future; clear roadmap for the future should be planned."*
- *"Capacity and application platforms should be available."*
- *"Licenses and license management should be part of the service."*
- *"When other customers are using this same model and when they are having some other application/environment in use → there might appear some good tips also to other customers."*

## When you are buying other applications / software's from other vendors, how do you take in to account cloud compatibility?

Many companies today are considering (or already buying) cloud services from several suppliers. And this is the situation when it might come as a surprise that the fitting of the several pieces together, from different suppliers, is not as an easy and simple task. This question was asked to be able to see have these customers taking that into account.

At the moment interviewees have not faced this as a problem, because cloud usage is still quite simple and they have not multi supplier model in use (or very minor one). But they all said that this is definitely going to need a lot more attention in the future. Here are interviewee's comments:

- *"Tieto Cloud Server can be integrated so that it is like their own system, so no problems with that. But this can be a problem for bigger companies who have a lot of different interfaces and suppliers."*
- *"Technical compatibility is checked as deeply as it is possible. Especially important is support model compatibility. Big question is how to create a whole product, not just separate modules."*

- *"Minor other cloud solutions, and no dependencies. Tieto is the biggest supplier for this customer and all the major solutions comes from Tieto."*
- *"This is not a big issue yet, but most certainly need a lot more attention in the future. Multi supplier model is very likely in use, in the future, in bigger companies. And those suppliers, who have solutions for this, are going to be successful in the market."*

## What do you see as a risk factor in moving your business to cloud?

There are of course also risks and drawbacks in cloud and these are already mentioned in this study Chapter 5.2. Customers concerns turned out to be exactly the same kind than in theoretic part author was mentioned; security of the cloud, what happens to data if contract is terminated, who is the owner of the data, license issue etc. Also it was mentioned in one interviewees comment about Tieto Cloud Server self-service portal security. Customer's comments are as follows:

- *"License issue: if Tieto Cloud server processor models are changed is customer forced to buy new licenses?"*
- *"Security issue: public cloud in general, there are certain security risk. No personal contacts → this is adding feeling of insecurity."*
- *"When signing contract customer needs to be very careful and there needs to be clear agreement about what happens if service ends for some reason; how data is transferred, destroyed etc."*
- *"Support/integration."*
- *"Ownership; who is the owner of data in cloud?"*
- *"Data security/authentication."*
- *"Data transformation."*
- *"Capacity problem; when all the capacity is from one source, what if some unexpected error situation occurs (configuration fault, it-system behind the cloud fails etc.)."*
- *"Cloud is shared environment and this might cause performance issue. Only concern in Tieto is the portal and customer trust information is secured. No big differences between the earlier and cloud solution."*

## What are the three first cloud services which come in to your mind?

Interviewees were asked to mention three first cloud services which come into they mind. This question is showing which companies are the most well-known players in the cloud service field.

With the biggest player, Amazon, Google and Microsoft, it was nice to hear also Tieto. One interviewee said that he has been very happily surprised to see Tieto having a solution that the biggest cloud service providers don`t have yet. And he was mentioned Tieto right after these three biggest word famous companies. Interviewee's comments are gathered to the table below.

| Companies | Case1 | Case2 | Case3 | Case4 |
|---|---|---|---|---|
| | Amazon | Salesforce | Amazon | Amazon |
| | Google | Microsoft | Google | Google |
| | Tieto | ServiceNow | Tieto | Microsoft |

Table 2. Three first service providers which came in the interviewees mind.


## What kind is ideal cloud service provider and what kind of cloud services you wish to have?

Next two questions are asked, because of the future. It is valuable information to hear how customer sees the ideal cloud provider and what kind of service they want to have. IT service providers always have to hear customers and it is very important try to be a little ahead of competitors by developing a new applications and model of services.

Customers are respecting trustful, technically in high level, cost effectiveness, flexible service provider who is offering standardized solutions. Good service provider knows the customer company and business well, shows care and respect to customer. Is proactive and bring new solutions and development ideas to customer. Also one customer commented that they still see human, personal service as an important issue. Customer's comments are as follows:

- *"Trustful; feeling that service provider has continuity. Services are up and running, no service breaks → reliability is guaranteed. Contracts and offerings are clear and understandable."*

- *"Personal, human service is important. Customer don`t want to have everything just from the Internet."*
- *"Technically in high level, trustful, cost effectiveness service*
- *Ready-made concept; in where it is taking into account also support, data, security etc. → productization!"*
- *"It should be easier than today. Flexibility; fast to get up and fast to get down. Order form should be clear; lot of different functions, different SLA`s to choose from, possibility to order really fast performance."*
- *"Respect customer, knows customer business well. Is proactive; bring new solutions, development ideas to customer."*
- *"Competitive; both in price and service quality."*

## Future prospects. How do you see your company future in the cloud business?

All interviewed companies see their company business in cloud in the future. Market situation, with demand of cost effectiveness and productivity, drives businesses to cloud. Cloud services are seen as an increasing future trend. The interviewees expressed their opinion on future as follows:

- *"Company is in the cloud also in the future. Future IT solutions are in the cloud, if the price of the service stays competitive. Nowadays customers/services require 24/7 monitoring etc. and small companies don`t have enough personnel and capacity for this, so cloud is good solution for them."*
- *"Metsä Group is using cloud when they see it is reasonable, they don`t see it as a "Silver Bullet" which can solve all the problems."*
- *"Most of the capacity will be order from the cloud. Cloud usage will increase with time."*
- *"Company future is in cloud. Cost effectiveness and scalability are so important at the moment."*

# 9 Conclusions

The framework for the empirical study was gathered information from the books and academic articles about cloud computing and what cloud is all about. Information from the Tieto Cloud Server model was gathered from Tieto Intra, Cloud Server service descriptions, technical documents and academic discussions with Tieto Cloud Specialists. The frame of the interviews was planned together with instructors. Questions were planned so that they would gain some interesting and useful information from the selected customers. Tieto Cloud Server model is quite a new service model and it has launched just recently, so this was limiting factor in the number of interviewees. By creating this study, author has got a lot of valuable information about cloud and this could be very useful also when doing career planning.

When the research sample is small, the analysis often is merely a description of the results and generalization of the results is difficult. This study has a qualitative research aspect of generating common understanding on the cloud computing and interpreting subjective feelings from the cloud customers.

The study result shows that by adopting cloud solutions, an organization can focus on their respective core business, as cloud providers are able to run operative IT better, faster and more cost-efficiently. The more company can turn fixed costs into variable costs, the more flexibility it gains. Cost savings and pricing were mentioned in all the interviews and it was seen as an important factor for companies to start moving their businesses to cloud.

Cloud allows an enterprises to access IT resources easily, anywhere and anytime with minimal need for supervision or oversight. Because there is no need for upfront investment, business owners can be emboldened to try out new ideas and see what works for them. Unlike hardware-based solutions, cloud setups are also easy to switch to a new provider or shut down entirely. All the interviewees emphasized the flexibility and scalability to be one of the most important benefits of cloud services.

The biggest technology opportunity for the companies today is to reduce their total expenses through targeted IT investments that are converted from sunken capital models to variable cost operating models (Hugos & Hulitzky 2011, p. 30). When technologies involving the Internet, web browsers, virtualized servers, parallel computing and open source software are combined, they produce an entirely fresh

set of possibilities for delivering computing resources (Hugos & Hulitzky 2011, p. 34). Cloud computing is this kind of combined technology.  In a few years, cloud as a defining characteristic will have lost its significance. It will be just another integral way of outsourcing. The difference from traditional application or infrastructure outsourcing is the business model, level of standardization, and rapid service start-up. Customers will, to various degrees, mix in-house, outsourced, yet still dedicated and cloud-sourced IT capabilities.

An IaaS model cloud enables on-demand provisioning of computational resources, in the form of virtual machines deployed in a cloud provider's datacentre, minimizing or even eliminating associated capital costs for cloud consumers, allowing capacity to be added or removed from their IT infrastructure in order to meet peak or fluctuating service demands and paying only for the actual capacity used. Future for IaaS service seems to be very positive. The future capacity services will be clearly business need driven and consumption based. Speed and simplicity are the key features that will take cloud further. In Market Vision research 2012, server capacity taken from the cloud (IaaS) was showing 11% in 2012, they predicted that it will grow to19% after two years and after five years server capacity taken from the cloud will be 27%. So there can be seen a big growth possibilities in the future in the IaaS service area.

But there are topics that need to be taken into consideration. In Market Vision Cloud service research 2013 they asked from the Finnish companies what are the reasons why they have not move to use cloud services, and especially Infrastructure as a Service service (IaaS). From the following picture you can see answers as percentages from those 92 companies.

| Main barries for using IaaS model | |
|---|---|
| | % of answers |
| We would like still to have more info about cloud benefits and costs | 65 |
| We are uncertain about the IaaS-model benefits to our company | 62 |
| We have too little information about IaaS service providers and they services | 46 |
| We want to produce our own infra | 45 |
| Information security issues | 40 |
| There are no suitable IaaS service solutions at the market | 23 |
| Total costs are too high for our company | 22 |
| Some other reason | 20 |
| Our existing contract are not supporting/prevent moving to IaaS cloud | 16 |

Figure 8. Main barriers for using IaaS model.

65% of the answers said that they still want to have more info about cloud benefits and costs for their company. Also the second and the third popular answers were related to same issue; customers need to have more information about cloud benefits to them. This is obviously one of the biggest challenges to cloud service providers; more information to customer's side is definitely needed. There are of course still companies who wanted to have their own infra (45% of the answers). Security remains one of the top concerns always when talking about cloud. More information is needed in security issues too.

Those Tieto customers, who were interviewed, were asked also that have they got enough information about the cloud and they all answered that they had received enough information about the cloud and especially from Tieto Cloud. However, they pointed out also importance of further information in the future about cloud developing, new offerings etc. Supplier need to be proactive.

Cloud computing will have a significant impact on the type and availability of IT jobs for the foreseeable future. In a 2012 study by IDC, underwritten by Microsoft, predicted that cloud computing will generate more than 15 million IT jobs by 2015. The bottom line seems to be that cloud computing is here to stay and it will drive a

redistribution of IT jobs from in-house positions to outsourced partners. Cloud server broker will be new role for the IT business.

A very real problem known with cloud computing is the present lack of standardization in the system. Cost reductions and efficiency improvements drives companies towards standardisation. This came up also with every interviewing author made. IT standardization is a strategy for minimizing IT costs within an organization by keeping hardware and software as consistent as possible and reducing the number of tools you have that address the same basic need. Standards can help businesses avoid dependence on a single supplier because the availability of standards opens up the market. Companies will also have increased confidence in the quality and reliability of suppliers who use standards. Earlier all the customers wanted to have own, private, tailor-made application, but this has now changed dramatically. Customers are requiring increase standardization of protocols and processes. Everyone wants to have package solution, with simple integration.

When talking about productization, there are also mentioned terms the service concepts creation and systematization. Sometimes productizing refers to the standardization of service product like, totally an adjusted asset. The objective of productization is to modernize and develop the business so that when the quality and productivity improves customer's benefits will be maximized and company performance will increase. Productization can be utilized in the development of services, although the aim is not to plan fully standardized service. (Jaakkola & Orava & Varjonen 2009, p. 1.) This is the great challenge at the moment to cloud service suppliers and definitely need a lot of attention inside Tieto also. Tieto Cloud Server model is nice, compact, standardized solution and easy to sell to customers and also easy to manage, but there are a lot other solutions in Tieto which are not yet at this level and this is requiring a lot of attention and energy in the future. Service/or some new solution productization process would be a good master thesis subject.

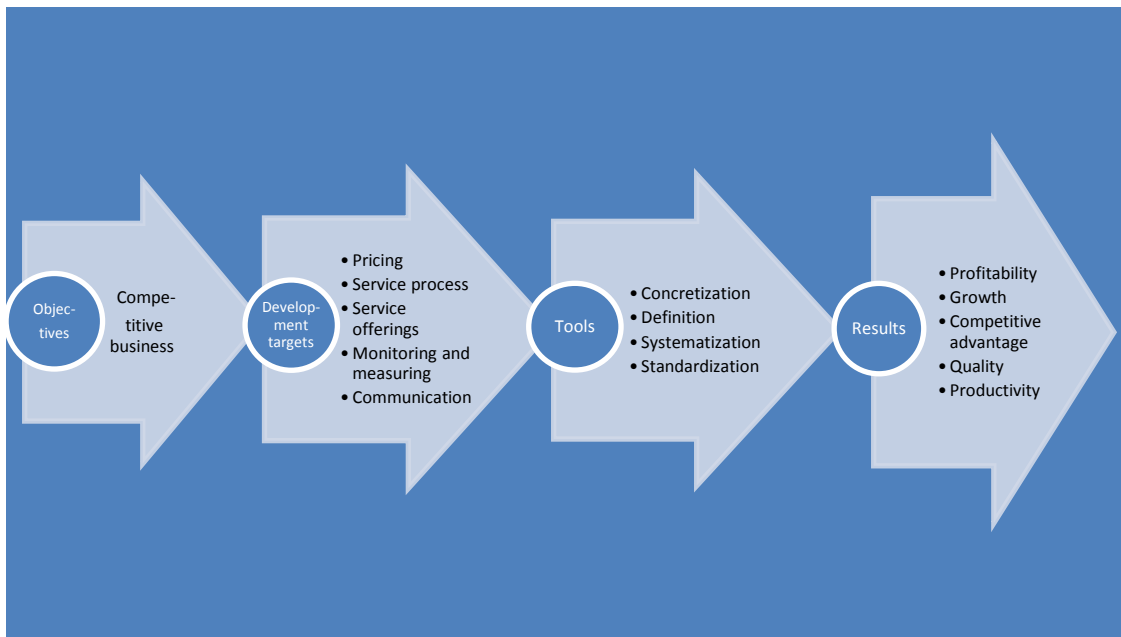From Figure 9 it is shown how business can be develop with productization.

Figure 9. Business development with productization (Jaakkola et al. 2009).

New services and service innovations are important in to the company's productivity and competitiveness point of view. Consumerization of IT is reality and it will set the scene for new type of service approach, building on advanced but easy self-service. Tieto Cloud Server model is Tieto´s answer to these requirements.

Company´s service offerings should develop with market requirements and customer needs. That's why it would be a good idea to interview these Tieto Cloud server customers again after one year. It is obvious that they will have a lot of feedback from this Cloud Server model and also development ideas to give to Tieto.

Together with efficiency (doing things right) and effectiveness (doing the right things), innovation, or doing something new, is fundamental to business improvement. In today`s obsession with efficiency, this often seems to be forgotten. Every moment of the day is utilized. An efficient dissemination of innovation via standards is a precondition for economic growth. New products and improved methods of production must quickly assert themselves as broadly as possible for a positive economic development. This means that company policy should not only stimulate innovation, but must also ensure its efficient diffusion. (Verlag 2000, p. 20.) In innovation projects, beside the general motivation methods, innovation itself is an important additional motivation factor. Many people want to create something new. For example Steve Jobs got the top developers for developing Apple by creating an atmosphere, in where, people felt to be a part of something historic. He did not even

need to compete with the salary. So, if person has passion about something, he is ready to use a lot of time and energy for creating it. It is important for innovator to find the correct people in the team and to give them enough responsibility, so that they can really feel to be part of something important. (Taatila & Suomala 2008, p. 97.)

Tieto was delivering IT services that fall within the cloud definition long before the growth in popularity. These have been delivered as a service over standard connections, with Tieto ownership of all IT assets, prices based on consumption and the customers being offered self-service capabilities. Tieto has competence in a large portfolio of vendors, platforms and technologies. With the power of strong technology alliances, Tieto cloud services personnel also work in close collaboration with leading technology companies for joint delivery of efficient, scalable, secure and sustainable cloud services. Tieto's key partners are Cisco, EMC, IBM, Google, Microsoft, Oracle, and SAP. (Tieto 2012.) This enables customers to combine the best solutions and gain the greatest benefit available. In order to do business in a highly competitive environment where options are increasing, suppliers are acutely aware that they must make migration as simple as possible for their new customers, in order to compete. (Hugos & Hulitzky 2011, p.151).

Tieto provides the ability to store data at a Tieto data centre at the customer's will, which may be on low-cost offshore premises or local. This data storage place seemed to be very important issue to all interviewees. There is a lot of information in the companies, when data cannot be stored outside of EU. Cloud services reduce environmental impact since infrastructure is shared among the customers, the infrastructure utilisation rate is maximised and non-utilised infra is automatically shut down.

The cloud does not meet all needs. In fact, it may be only a small part of the answer to customer challenges. Cloud computing provides cost savings in some situations, but cost savings is not the most important benefit. The real value of cloud computing is the way in which it can be used to support an overall strategy designed to create agility for the business. Tieto sees cloud services as one additional path for response to customers' business needs. (Tieto 2013.)

Tieto`s President and CEO commented as follows in press release 25th April 2013: "*The Nordic IT services market continues to be dynamic with enterprises actively adopting new technologies. This transformation-centric customer agenda fits well with our priorities. Our focus remains on innovation, solution packaging and a global*

*delivery scale – all of which improve competitiveness. As an example, our recently launched cloud services have received a positive response during the first quarter with customers signing up to this highly efficient and flexible service concept".*

Tieto`s Technical Director says in Talouselämä blog, that: *"Now, in the 2010's cloud services will generate a new arc of development. One of the basic ideas is a radical reduction in the number of manual work. Only in that way we can achieve streamlined business, which shows as a new level of speed, flexibility and integration throughout the whole organization".*

Despite the limitations of the study and the research aspect of generating wider understanding on the issue and interpreting subjective interviewee's feelings about cloud, not producing exact results and generalizations, the study results shows the importance of cloud as a new model of doing business, importance of product standardization and it also shows how important it is to create a new, innovative service models.

## 9.1 Summary

The importance of the cloud became very clear to author when doing this thesis. There are set a lot of high expectations to cloud from customer side as well as cloud service provider's side. It is hoped to achieve with the cloud solutions cheaper, easier, more efficient, standardized solutions, which are invoiced based on real consuming and capacity is always at the right level relative to usage.

Innovative new products and services are vital to IT companies who want to succeed and to be able to compete in the highly demanding IT business area. Space, time and resources for this thinking and innovation work, needs to be realized and approved from the grass-roots level to company top management level.

Information that the author has gained about cloud in general, cloud management, IaaS, Tieto Cloud Server model and customers thoughts during the creation process of this thesis has been significant. It will be very useful information when discussing with customers and Tieto colleagues. Cloud is still so new, that the master thesis creation of this topic was very interesting. Especially pleasing was that all the reference materials were fresh and recently written. The subject of the thesis was well chosen.

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3. Company expectations from the cloud

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5. Have your expectations been filled?

6. Have you had any problems related to cloud?

7. Have you received enough information from the cloud? From Tieto and/or other sources?

8. Is there a difference for your company in where data is stored?

9. Have you already use Tieto Cloud Server self-service portal? Do you see that it could have an effect to your organization structure?

10. Any improvement ideas to Tieto? What kind of add-ons or appliances you wish to order via self-service tool in the future?

11. When you are buying other applications / software's from other vendors, how do you take in to account cloud compatibility?

12. What do you see as a risk factor in moving your business to cloud?

13. What are the three first cloud services which come in to your mind?

14. What kind is ideal cloud service provider and what kind of cloud services you wish to have?

15. Future prospects? How do you see your future in the cloud business?