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CLOUD COMPUTING IN THE ICT OF FINNISH PUBLIC ADMINISTRATION

Bachelor's thesis 2011

ABSTRACT
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Cloud computing offers unlimited ICT capacity and applications as an online service. The provider of the service is responsible for the resources: hardware, maintenance, updating, security, and other essential resources. All that is left for the customer is to find the right services that help the customer to improve its performance. By doing so, the customer is able to focus on its core businesses.

Buying huge facilities for governmental ICT is not necessary or beneficial today when governments can buy all the ICT services they need according to the momentary demand. Cloud computing offers the same benefits for the public sector as for the businesses in the private sector. Therefore Japan, the United Kingdom, the United States of America and other countries are taking cloud computing as part of their ICT architecture. It can help public administrations and other public organs to cut costs and gain other benefits as well. Therefore governments examine cloud computing as a future way of their ICT architecture.

Cloud computing markets are relatively new and they are still developing. There are numerous advantages and benefits that can be gained through cloud computing, but there are also limitations and challenges towards it. Therefore cloud computing has to be examined and tested to see its effects and to develop the technology and practices even further and take them into everyday use.

In Finland the public administration has only started to plan an exploratory research of centralized usage of ICT. This could create an opportunity for cloud computing if the public administration sees cloud computing as an opportunity, not as a momentary trend.

The target of this thesis is to familiarize the reader with the concept of cloud computing, introduce the cloud computing models of the example countries, introduce the current state of cloud computing in the public administration in Finland and unfold the plans that the Finnish public administration has for cloud computing.

Keywords: cloud computing, information and communications technology, government ICT.

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1 INTRODUCTION

Nowadays the public sectors in the developed economies are constantly looking for ways to improve the efficiency of their own units and also ways to save money, especially in the economic situation that we are in at the moment. Cloud computing is one way to save money and increase efficiency at the same time.

Mell and Grance (2009) of the National Institute of Standards and Technology (NIST), that operates in the United States of America (USA), define cloud computing as follows: “Cloud computing is a model for enabling omnipresent, 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”. Well known examples of cloud computing are Facebook and browser e-mail.

This thesis takes a look at cloud computing from the point of view of public administration. Could cloud computing be the solution to help the public administration ICT to be more cost efficient? What exactly is cloud computing? How can the public administrations benefit from it? What plans does the public administration of Finland have towards cloud computing? The thesis will familiarize the reader with the concept of cloud computing. It also introduces the cloud computing in public administrations in Japan, the United Kingdom and the USA, examines the cloud computing plans and actions in the public administration of Finland. The purpose is also to find out what the effects of cloud computing are, when it is implemented in to public organizations.

The statement of Communications Minister on a information society day, held in Helsinki March 10th 2010 gave thin guidelines for the future development of information and communications technology in Finland. The Minister told that all the services of the public sector that can be placed on internet, should be there. There are proposals for opening the public information databases for everyone, on an easy access and easy to use basis. This increases the opportunities for

the cloud computing markets. It was also mentioned that the role of cloud computing is for the 2010's similar to the role of mobile technology in the 1990's and the internet in the 2000's. As one of the top countries, when it comes to information and communications technology, Finland should already have some plans to implement cloud computing, not just in the private sector but also in the public administration. Cloud computing could help the government to save money and gain other significant benefits, but also with help from the government, Finland could become one of the leading countries in the rising industry of cloud computing. (Tuominen 2011)

1.1 Justifications for the topic

Cloud computing is one of the top trends in information and communications technology. Finland is one of the top countries in information and communications technology and the governments' purchaser – provider model supports the idea of cloud computing. In Finland, the government spends money by maintaining several different data centers in decentralized locations, and they consume and bind capital that could be saved for other purposes.

Many governments are implementing cloud computing services for their use, in the name of cost saving, improving efficiency, agility and other benefits. This thesis examines the benefits of cloud computing and also the problems that can be seen in implementing cloud computing.

As one of the leading countries in information and communications technology, Finland could already have plans of action for cloud computing. This thesis will also introduce the reader to the idea of cloud computing, introduce other countries' plans and actions in implementing cloud computing, and find out a strategy for the Finnish public administration towards cloud computing.

1.2 Definition and aim of the research

In this thesis there are four main points to follow.

The first one is to introduce the concept of cloud computing. The aim is to explain what it means, characteristics, service models, deployment models and the advantages and disadvantages. There will also be cloud computing market forecasts from international research companies.

The second point is to introduce the cloud computing models that have already been taken in to use by other governments and the outcomes of the implementation. As some developed countries have already started to develop and use governmental cloud computing service models, the aim here is to introduce them and find out what the governments want to accomplish with cloud computing and what the effects are. There are also some projects that have not been taken into action yet. The example countries are the United Kingdom, the United States of America and Japan. There will also be a comparison with the example countries and Finland.

The third main point is to find out what plans does the Finnish public administration have regarding cloud computing. The emphasis of this part is on a focused interview with a government representative. The interviewee is an official at the Management Unit of Government IT Operations. Their unit works under the Ministry of Finance. Their unit and its role will be also introduced.

The fourth point is to introduce the results of the findings and to make a suggestion for an ideal cloud computing model for the Finnish government.

1.3 Research methods

The empirical part consists of a qualitative survey in the form of a focused interview. The current state of cloud computing in the governmental bureaus can be found out through interviews with a professional. The current state helps to understand the demand and future plans for cloud computing. This also helps to understand what the public administrations visions and attitudes towards cloud computing are.

The focused interview was done with an adviser of the Management Unit of Government IT Operations (Valtion IT-toiminnan johtamisyksikkö), which is part of the Ministry of Finance. It is responsible for management and coordination of the government IT operations. It is also responsible as an owner for the shared IT service development and directing and quality control of the production. One part of the unit's responsibility is also the financial management of the IT operations, security and precautionary guidance, municipality-government cooperation and collaboration in international IT operations. (Ministry of Finance 2011)

2 CLOUD COMPUTING

Cloud computing is a hot topic in the information and communications technology (ICT) industry at the moment. This is simply because many cloud computing service providers see that there is a huge market potential.

To understand what the hype is about, it is essential to understand what cloud computing is and what kind of expectations there are towards it. In this chapter I will take a look at the current and expected markets and also get familiar with the concept of cloud computing.

2.1 Definition of cloud computing

Cloud computing is a developing industry. That is why its definitions, technologies, risks and benefits are developing and changing constantly. Therefore defining cloud computing is challenging because there are numerous different theories and more are coming every day. Nevertheless this topic is important in order to separate real cloud computing from other services, applications and technologies which, for example, have a "cloud" prefix just for marketing purposes and they do not have much to do with the actual cloud computing. In general language, cloud computing is computing capacity, applications or other services that have been acquired from the internet. (Heino 2010, p. 32)

Defining cloud computing also helps the reader who is unfamiliar with the topic to understand what is meant by cloud computing and get familiar with the topic more deeply. Cloud computing represents a wide entirety, which consists of several models, service providers and opportunities. With this definition I give a picture of the general issues of cloud computing, without addressing every detail. (Salo 2010, p. 16)

Cloud computing is a model in which the ICT resources are offered to the customer through a network and the customer does not need to know where they are located or take care of their operations or maintenance. (Salo 2010, p. 16)

National Institute of Standards and Technology (NIST) that operates in the USA gives a well-used frame for cloud computing. Their model highlights availability and it consists of five essential characteristics, three service models and four deployment models. The NISTs cloud computing model is used as the body of this definition because the NIST model is universally applicable and easy to understand. (Mell & Grance 2009)

Cloud computing provides the usage of IT resources through network according to the customer needs. The resources can be servers, information storages, software applications, services and so forth. One of the most important characteristics of cloud computing is that the resources can be acquired and removed with minimal effort from the buyer and service provider. (Salo 2010, p. 17)

Two of the most well-known cloud computing services are browser e-mail and Facebook. In either of these the user does not necessarily know where the servers are, and they do not even need to know that. Moreover these services can be used for example with a cell phone, so to use these applications the customer does not need to have high-powered devices because these applications are located in the cloud. (Salo 2010, p. 16 & 18)

2.1.1 Characteristics

Defining characteristics and creating standards are important from the customers' point of view because it makes it easier for the customer to compare the wide variety of different services and it also makes it easier for the customer to find out what services there are. It is also easier to define the compatibility of different services and technical equipment.

The NIST that operates under the U.S. Department of Commerce defines standards for the public administration. NIST has defined five characteristics to define cloud computing.

On-demand self-service

The customer can unilaterally adjust the ICT recourses, like server amounts and memory capacity, according to their own needs with the principal of self-service, where the customer does not have to contact the service provider. (Mell & Grance 2009)

Broad network access

Cloud computing services are available through the service network and they can be used with different types of devices, for example cell phone, laptop computer or palm devices. The services adjust to the device, not vice versa. This brings lots of liberty to the customer's equipment acquisitions because the services and applications do not define the system requirements. (Salo 2010, p. 21)

Resource pooling

The resources of the service provider have been arranged to serve multiple customers by using a model where different types of physical and virtual resources are taken into use, transferred and removed according to demand. Normally the customer does nott have any information or control over the location of the resources but, if needed, the location can be defined accurately, for example country, region or even a precise server center. (Mell & Grance 2009)

Rapid elasticity

The resources can be acquired and removed rapidly and flexibly, in some cases even automatically. For the customer, the resources are unlimited, additional capacity can be acquired as much as necessary and whenever needed. The resources are accessible when they are needed but, the customer pays only for the usage. (Mell & Grance 2009)

For example if the customer has a task that takes one server 100 hours to process, the customer can buy 100 servers from a cloud to do the same processing just in one hour, and the price is the same for one cloud server for 100 hours or 100 cloud servers for 1 hour.

Measured Service

Cloud computing systems control and optimize the usage of the resources by automatically measuring and adjusting them constantly. The usage of the resources can be easily monitored, controlled and it is easy to gather statistical information of them, which gives the services and prices more transparency for the user and also for the service provider. (Mell & Grance 2009)

2.1.2 Service models

Cloud computing architecture is normally divided to three layers in which the infrastructure creates the ground for the service platform on which the software can be built. (Salo 2010, p. 22)

Cloud Software as a Service (SaaS)

A customer is offered an application which is used in the cloud infrastructure. The customer does not own, install, maintain or update it. Instead the customer acquires the application when it is needed and pays a fee that can be based for example on the usage time. The customer can use these applications with several different devices with light plug-ins, for example with an internet browser. A practical example is a browser e-mail which is well known and

familiar to people who use computers daily and it has been in use for several years. The customer does not control the cloud computing infrastructure (network, servers, operating system etc.) or even the most features of individual applications. (Salo 2010, p. 22)

Cloud Platform as a Service (PaaS)

The service provider offers to the customer a platform that is located in the cloud computing infrastructure. On the platform can be created, maintained and developed the applications that the customer needs. The customer does not control the cloud computing infrastructure, but the customer controls the applications and possibly the applications hosting environment configurations. An example of this type of platform is the Google App Engine. (Salo 2010, p. 23)

Cloud Infrastructure as a Service (IaaS)

The service provider offers the customer information processing and storage capacity, network and other basic IT resources as a service. The customer can use its own software which can consist of operating systems or applications. The customer does not have control over the infrastructure, but can control the software, memory capacity, applications etc. so that the service provider is responsible only for the functionality of its resources; everything else is left for the customer. (Salo 2010, p. 23)

2.1.3 Deployment models

According to Salo 2010, in addition to the service models, cloud computing means services offered by the cloud computing service provider but, also the procedures produced by the customer, which are like the previously mentioned models but, there are also other kinds of models. NIST has determined four cloud computing deployment models as follows.

Private cloud

In this model the cloud computing infrastructure is owned by the organization and is used by the organization alone. Administration can be in hands of a third party and the hardware can be located somewhere else than the organization's own premises. (Salo 2010, p. 19)

Community cloud

The ownership and usage of the cloud computing infrastructure has been shared with multiple organizations. Administration can be in hands of a third party or the organizations and the hardware can be located in the organization's own premises or somewhere else. (Mell & Grance 2009)

Public cloud

Public cloud is a cloud computing infrastructure that reaches to multiple administrative domains. It is accessible for the public or available for a large amount of other users, without physically determining the location of the resources. Normally it is owned by an organization that sells cloud computing services. (Mell & Grance 2009)

Hybrid cloud

In this model the cloud computing infrastructure is a combination of two or more clouds. The clouds remain as individual entireties, but have been united with standardized or patented technology, which makes it possible to move information and applications. (Mell & Grance 2009)

2.2 Cloud computing markets

It is estimated that 1.6 billion people have a PC at home and one quarter of the world's population, i.e. 1.7 billion people, use the internet. An international research institute, Gartner, which operates in 80 countries, predicts that the

amount of people using the internet exceeds 3 billion by the year 2014. (Salo 2010, p. 7)

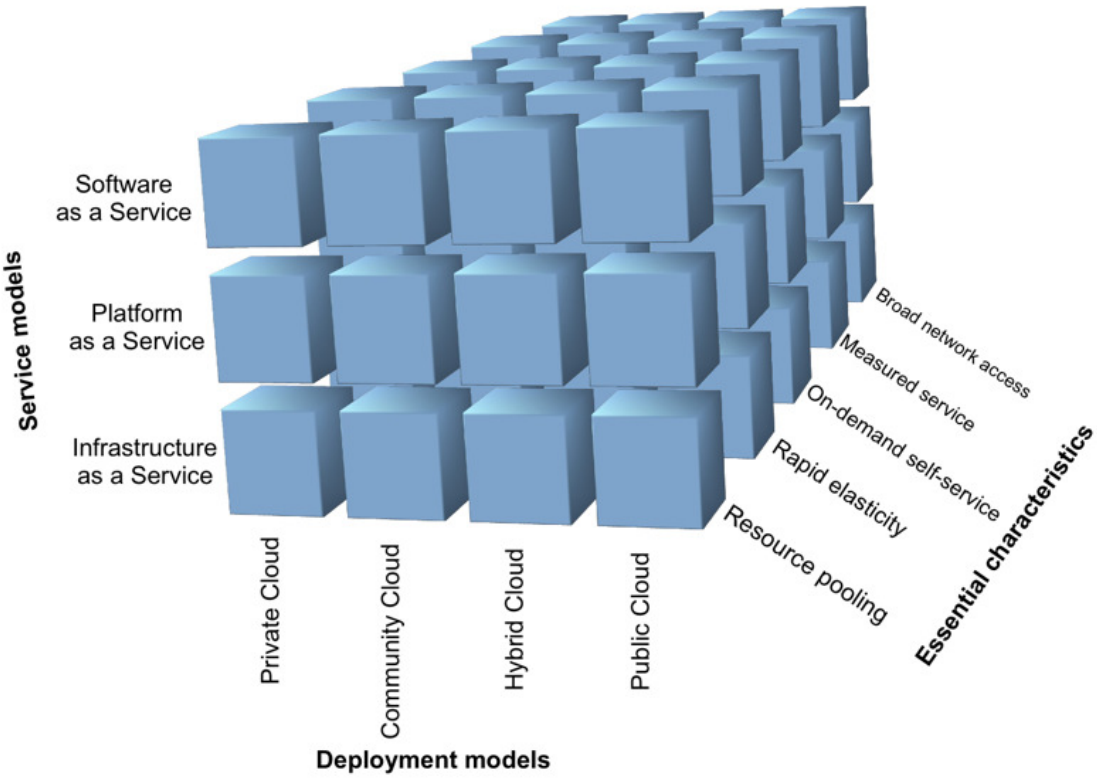
Cloud computing is used already in many companies and communities. About one third of the Finnish companies are using cloud computing services. (Vartia 2011)

As the ICT industry grows as a whole, cloud computing markets increase with it. Gartner predicts that the global cloud computing market will triple in size from the year 2009 by the year 2013, when the market size would be 150 billion dollars. Consultant office Merryll Lynch's estimation for the market size by the end of 2011 is 160 billion dollars. The basis of calculating varies. Gartner included internet advertising, which covers over half of the Gartner's 2009 estimation. International Data Corporation (IDC) presents a more restrained evaluation: in September 2009 they estimated the size of cloud computing markets would have been 17.4 billion dollars in 2009 and they would grow up to 44.2 billion dollars by the year 2013. Cloud computing services are relatively new and although server centers are being built and expanded at an accelerating pace, the size of cloud computing markets, in proportion to the ICT markets, is quite small. The size of ICT markets in 2008 was estimated to be 3.7 trillion dollars. (Salo 2010, p. 7)

Some of the biggest companies offering cloud computing services are Amazon, Google and Microsoft. They are better known for their other businesses, but they are also getting into the cloud computing business and the reason can be seen from the estimated market growth. Even the most restrained estimations promise a growth of several billions of dollars just in a few years. (Top 10 cloud computing providers of 2011)

2.3 Summary

The NIST's cloud computing definition can be shown as a cloud cube, as shown in picture 1 cloud cube. In picture 1, the characteristics, deployment models and the service models have been combined in to one entity.



Picture 1. Cloud cube (Craig-Wood 2010)

One of the main reasons why public administration would implement the cloud computing is that owning, maintaining and developing ICT hardware and software are not the core functions of governmental organizations. They are just tools to support their functions. Another main reason is that ICT capacity costs money when it is unused, for example at nights, during holidays and on weekends. (Salo 2010, p. 44)

The benefits of cloud computing include the savings that are gained from the usage based billing, rapid elasticity, need-based scalability and location independence. It also saves the customer money on the equipment purchases, enables continuously updated software and makes it easier to share information and intensifies cooperation. Moreover it extracts the resource limitations, maintenance of complicated systems, and need of updating and storage space. It also decreases overlapping actions. (Salo 2010, p. 45)

Cloud computing brings some challenges, such as designing nontraditional business applications and administration. Security, safety and reliability are

existing risks and they raise suspicion among the operators in the ICT field. Also completing the usage of already made ICT investments, employee know-how and legislative issues are considered as obstacles that slow down the implementation of cloud computing. (Salo 2010, p. 100)

The service providers are facing many challenges like always when introducing new types of approaches and patterns. The customers have to be convinced of the benefits of cloud computing and the security and reliability risks have to be minimized. (Salo 2010, p. 21)

Cloud computing industry is constantly developing, both the services and technology. This means that the advantages and disadvantages are also under continuous change. (Heino 2010, p. 20 & 21)

3 CLOUD COMPUTING IN THE PUBLIC ADMINISTRATIONS ABROAD

In the public administration, there is a need to adopt new technology that can save money, especially in this economical situation that we are in at the moment, where most of the financing of the public sector in the western countries, especially the social services, are in crisis. Some of the developed countries see cloud computing as a partial solution to their problems. (Heino 2010, p. 222)

The United Kingdom (UK), the United States of America (USA) and Japan are good examples because their cloud computing actions and plans are different, they are developed economies and there is lots of information about their cloud computing. (Heino 2010, p. 221)

Behind the massive cloud computing programs in the UK, the USA and Japan are the practices that the public administration normally acquire and maintain the systems divided to each sector. They are expensive, so the governments have invested in programs that aim to create joint applications and technical environments. (Heino 2010, p. 222)

3.1 United States of America

In the USA, the governments IT budget is 75 billion dollars (approximately 52 billion euros). The whole government's official web portal, usa.gov, has been moved to a cloud, called Enterprise Cloud, which is produced by a company named Terremark. Usa.gov is managed by U.S. General Services Administration's (GSA) Office of Citizen Services and Communications and the portal is an easy-to-search, free-access site for finding information, on USA local, state and federal government agency websites in a centralized manner. (Globe Newswire 2009)

Enterprise Cloud will benefit GSA by bringing reliability and agility to handle any spikes in online traffic. (Globe Newswire 2009)

USA.gov is one of the busiest US government websites, with approximately 100 million daily visitors, but this website is designed to serve as a hub to access information. However, the online traffic varies, for example: during a natural disaster or when the unemployment rates are revealed the traffic increases significantly. Before the cloud, when online traffic peaks occurred, there were long delays and the users suffered also from downtime. As a response to the spikes, the GSA acquired more hardware. This extra equipment waited to handle the spikes, but during normal traffic it just wasted power and other resources. (Staten et al. 2009)

The GSA needed to optimize its hardware and improve the services, but still hold on to the security issues and regulations. Terremark's IaaS platform, Enterprise Cloud, was the answer. The actual transfer took only 10 days and the testing of the new cloud was done in a weekend. (Staten et al. 2009)

As a result of Terremark's cloud platform adaption, GSA succeeded in cutting costs and improving performance. Now, whenever a spike occurs in the traffic on the websites, GSA will get more resources for its use from Terremark's data center, and this improves the websites performance, whereas the old system

would have slowed down the website or it could even have crashed. They pay extra for the extra resources, but during normal traffic, they pay only the amount as written on the contract. Martha Dorris, the Deputy Associate Administrator of The Office of Citizen Services, estimated that transferring to Terremark's cloud platform cuts costs by 90% and at the same time it improves the performance and flexibility. (Staten et al. 2009)

As an outcome of the positive results, GSA started to plan moving Data.gov onto the same cloud platform. The central government supports the cloud computing model strongly for example in a form of a apps.gov page. Also the army of USA is piloting a company called salesforce.com on renewing its recruitment system. The state of Utah is transferring its 1 800 physical servers from 35 different locations into one single private cloud. (Staten et al. 2009)

3.2 United Kingdom

In the UK, the annual IT budget of the government is approximately 15 billion pounds (just about 18 billion euros). Chancellor of the Exchequer, George Osbourne, introduced a nine-point spending review for all government departments, setting heavy spending cuts of 20%. This created the idea of bringing cloud computing in to the use of the government. (Kiss 2010)

"The UK Government's CIO, John Suffolk, announced the establishment of a UK onshore, private Government Cloud Computing Infrastructure called G-Cloud." (G-cloud 2011)

G-Cloud is planned to be everything from pooled government data centers, collaboration tools, government's private Wikipedia and communal email. There is also a plan of a government's own application store where the tools, that are proven to be useful, can be shared with all governmental departments. (Kiss 2010)

According to the plan, by the year 2015, 80% of the governmental departments would be using the G-Cloud. The plan claims to save 3.2 billion pounds of the

government's annual 16 billion pounds IT budget. This meets the 20% costs savings that is the chancellor's target. Logistically this aims to replace the government's ad-hoc network with 12 governmental data centers. The data centers would cost approximately 250 million pounds per piece. (Kiss 2010)

The financial reasons are not the only advantages why the G-Cloud is seen beneficial. It also improves security when private information would be hosted in the government's secure cloud and individuals could not anymore download data onto their own USB-sticks. Still some services with vital importance would be separated from the G-Cloud, like security services. Other benefits include also the opportunity to create energy efficient practices, for example in Hampshire, there was developed a data center that uses the heat, created by the servers, to warm the whole building during cold periods and during winter time. (Kiss 2010)

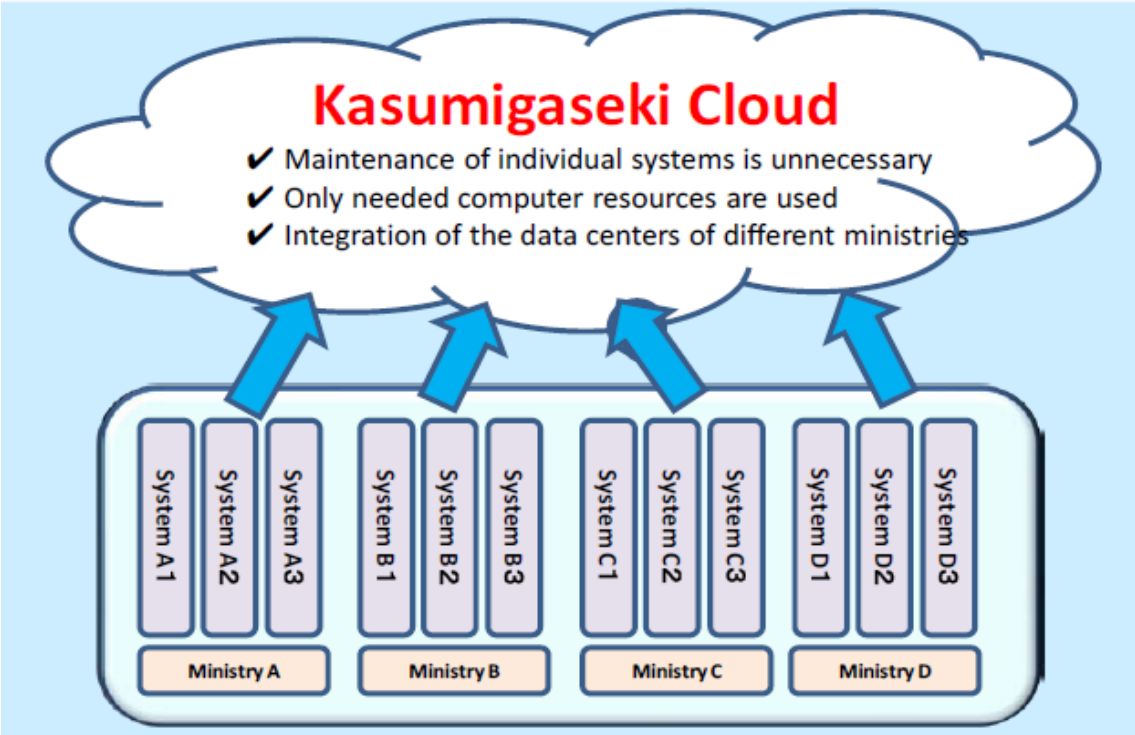
Nonetheless, in the UK government's recent ITC strategy, there was no mention of the G-Cloud. According to Bill McCluggage, the Deputy Chief Information Officer of the UK Cabinet Office, it is up to individual departments and ministries to decide in which manner and how deeply they are going to adopt cloud computing in to their use. (Heath 2011a)

The United Kingdom's Ministry of Justice (MoJ) has signed a five-year deal to host its ERP system on Government Wide Service (GWS) cloud computing platform. GWS is a cloud infrastructure that enables remote access to its systems and it meets the government's IL3 security standards. MoJ's ERP system is planned to be in use by spring 2013 and it will serve over 80 000 users by providing them transactional and professional services. This 14 million pound deal is expected to save 28 million pounds yearly from 2013. The MoJ is the second office of the UK government to join GWS, since the Home Office is already hosting its applications on the GWS. (Heath 2011b)

3.3 Japan

The global economic crisis has struck hard on Japan's export driven economy. As a partial solution to cut costs and support sustainable growth the Ministry of Internal Affairs and communications (MIC) has come up with the Hatoyama plan, introduced in 2009. The total ICT market was approximately 100 trillion yen (860 billion euros) in 2009. The Hatoyama plan aims to create new ICT markets, to stimulate the Japanese economy, sized several trillions of yens and at the same time creating 300 000 – 400 000 new jobs by a new strategy created for ICT industries that draws capital investments. The Hatoyama plan targets also to create new ICT markets of 100 trillion yen by the year 2020. (Digital Japan Creation Project 2009)

As a part of the Hatoyama plan the government is planning to create a nationwide cloud computing infrastructure, the Kasumigaseki cloud, in stages by the year 2015. The Kasumigaseki cloud provides the governmental departments with platforms for shared functions, uniforming systems and practices and decreasing process times. These and other benefits can be seen in picture 2, Kasumigaseki cloud. It also aims to save governments money in operating and development costs and provides the citizens and government employees with secure and advanced services. It is also planned that later on the educational facilities, hospitals, libraries, public offices, emergency services etc. would create their own regional ICT communities and they would also be combined with the Kasumigaseki cloud, making it grow even more and making it really substantial. (Digital Japan Creation Project 2009)



Picture 2. Kasumigaseki cloud (Digital Japan Creation Project 2009)

One part of the Kasumigaseki cloud is the National Digital Archive. Also new types of services for information and communication will be created and evolved. The National Digital Archive will consist of “digitized government documents, books and scholarly articles, cultural property information, geographic and time space information, statistical information, and other information for which there is high demand and to standardize formats and metadata to provide the highest degree of access to the public.” (Kasumigaseki cloud 2011)

Because the usage rate of the internet and other communications networks is high and growing fast, Japan wants to develop so called green data centers for cloud computing. It is not done only to save in costs but also to save energy, to support the industry that creates renewable energy sources and to reduce the production of carbon dioxide. This will be done by using wind and solar power, locating the data centers to cold places, like underground, mountain regions etc. to save in cooling costs. (Kasumigaseki cloud 2011)

3.4 Summary

Andrea Di Maio, an analyst in the international research institute Gartner, commented the USA's and UK's cloud computing projects as follows: "The US is leading the field in terms of public practice and agencies trying things out, but from a strategy perspective the UK is leading with the G-Cloud. Governments can save a significant amount of money but also resolve some of the worries about managing IT, and focus the resources government has on what is really mission critical." (Kiss 2010)

The USA is aiming to save money by letting the private sector to take care of its cloud computing. This is estimated to create significant savings, but even in the United Sates public administration cloud computing has just started to gain a foot step. (Heino 2010, p. 221)

The United Kingdom is aiming to create its own facilities for cloud computing, keeping their ICT still strictly in the hands of the public administration but, at the same time, gaining the benefits that cloud computing offers. (Kiss 2010)

Japan is well known as a country of high technology and that shows in their ambitious plan of creating new ICT markets and also in the scope that they are planning to take cloud computing in the public administration and also in other sectors. Also the advanced technology in Japan allows them to take these huge steps, for example wireless internet access is available practically everywhere and the bandwidth speed is Japan is the highest in the world, this is highly beneficial for the users of cloud computing because the bandwidth is often seen as the "bottleneck" of full exploitation of cloud computing. (Salo 2010, p. 101)

Buying huge facilities for governmental ICT is not necessary or beneficial today when governments can buy services according to the current need in a centralized manner. Also many departments are using similar computer applications and other tools, so developing tailor-made solutions and sharing them inside the whole government is a perfect opportunity for cloud computing and of course for the government itself. It can help public administrations and

other public organizations to cut costs and gain other benefits as well. Therefore governments examine cloud computing as a future way of ICT architecture. (Heino 2010, p. 221)

4 CLOUD COMPUTING IN THE PUBLIC ADMINISTRATION OF FINLAND

Finland is one of the leading ICT countries. Was it measured with average broadband speed, number of smart phones per capita, number of computers per capita, number of internet connections per capita or other measures, Finland is always in the upper end of the list. The Finnish government also advertises Finland as “information society”. Although approximately 33% of Finnish companies use cloud computing and there are companies that offer cloud computing services in Finland, in Finnish, for example Tieto Oyj, Logica and HP, the public administration of Finland is not a pacemaker in this field. (Vartia 2011)

4.1 Introduction to IT in Finnish public administration

The Finnish government spent 2 061 million euros on ICT in 2009. Of this figure, the municipalities spent 1 000 million, the government 911 million euros and indirectly by the government 150 million. 75% of the budget is spent on usage, support and maintenance and the rest 25% is spent on new systems. (Benson 2010, p.5)

57% of the budget is used to purchase services, 23% goes to salaries and commissions and the rest 20% is used for equipment and software. (Valtionvarainministeriö 2011, p. 8)

ICT in the public administration covers 23% of the whole ICT markets in Finland. The IT personnel accounts for 3.7% in the total personnel of the government, meaning that there are 4 350 people working with IT in the government. (Benson 2010, p.5)

In the public administration there are plans of uniforming the public administration ICT systems. The plans include creating standardized working stations for every government employee and purchasing ICT systems in a centralized manner, but the plans do not include cloud computing in the same scale and scope as in the example countries. (Benson 2010, p.16 & 9.)

4.2 Interview

The Finnish government being as bureaucratic as it is, at first it was difficult to find the right person to give the information needed. I managed to contact Anna-Maija Karjalainen, director at Government IT Shared Service Center's (Valtion IT-palvelukeskus), but she did not have the information that was needed. She referred me to Tuomo Pigg, advisor in the Management Unit of Government IT Operations (Valtion IT-toiminnan johtamisyksikkö), who was able to provide the neccessary information in person.

The Government IT Shared Service Center is one of the main governmental organizations aiming to improve and support the administrative operations of administrative sectors and agencies. It was established in the beginning of the year 2009 and it is governed by the Management Unit of Government IT Operations, which operates under the Ministry of Finance. (Valtiokonttori 2011)

The interview consists of several e-mails between me and Mr. Pigg. My first questions were about who and what bureaus provide the information about cloud computing. I also asked about the past, ongoing and future cloud computing projects conducted by the government. What kind of systems have already been implemented? What is the governments cloud computing strategy? Are any other plans for cloud computing in the government and what are those plans?

The Management Unit of Government IT Operations has planned to start an exploratory research about outsourcing IT services, meaning that the maintenance, support, monitoring and helpdesk services of the IT systems would be managed by third party. After completing the research, these services are meant to be acquired in a centralized manner for the whole public

administration. At the moment all the ministries and departments are buying these services independently. The aim of the exploratory research is to produce a realistic and justified proposal for a model in which the outsourcing of IT services would be arranged for the public administration and also a proposal of the actions that are needed to be done to execute the plan. The emphasis of the research will be on the outsourcing of IT services and also on organizing the production of services, on defining the implementation model, on the structure of the life span costs and also on the user and environment friendliness of the server environment. (Pigg 2011)

The objective is met by finding out the current state, current costs and comparing the findings to the reference material. First there is a questionnaire about the demand and investment calculations. The exploratory research aims to defining the ideal state in which the outsourcing of the IT services should be implemented after 5-10 years. (Pigg 2011)

Moreover, a policy has to be created that clarifies the following issues: What will be bought from the private sector and what services are produced by the government officials. Where the datacenters can be located and from which location can the maintenance and control tasks be run. What services can be bought as a cloud computing service. How should the reliability of the services be taken care of. What are the roles of the bureaus and the Government IT Shared Service Center in managing the services. Is it reasonable to centralize the own production of IT services and if it is, where should it be centralized. What data centers the government has at the moment and what kind of centers they are. The exploratory research also clarifies how and in what kind of stages the services are reasonable to acquire from the private sector. (Pigg 2011)

At the moment the government does not have a uniform strategy about outsourcing IT services or about cloud computing. The Management Unit of Government IT Operations or even the Ministry of Finance do not know in what scale or scope the bureaus are using cloud computing services. Every bureau decides on its own IT acquisitions. (Pigg 2011)

In the public administration of Finland, including all the ministries and the Prime Minister's office, there are 179 computer halls (2009: 239 halls) and these hold 3 756 servers (6221 servers in 2009) and there were 94 989 work stations in 2010. 86% of the organizations have their own computer halls. The following text and graphs provide the information on the server numbers in the government in 2008, 2009 and 2010. There are also justifications for the changes in numbers. (Valtionvarainministeriö 2011 p.45)

As shown on chart 1a, File and printing servers, there were 2 630 file and printing servers in 2008, in 2009 the amount increased to 3 384 as a result of additions in Tax Administration, Universities of Applied Sciences and the Center of Economic Development, Transport and the Environment. In 2010 there were only 1 500 file and printing servers in the government bureaus and institutions. The number decreased severely because of the changes in the governmental organization, therefore the servers of the universities (1 300 servers) are no longer counted as a part of the governments servers. Still, leaving out the servers in universities, there is a reduction of 30% in the government file and printing server number. This is mainly the result of development in the file and document process control and outsourcing the printing services. (Valtionvarainministeriö 2011, p.45)

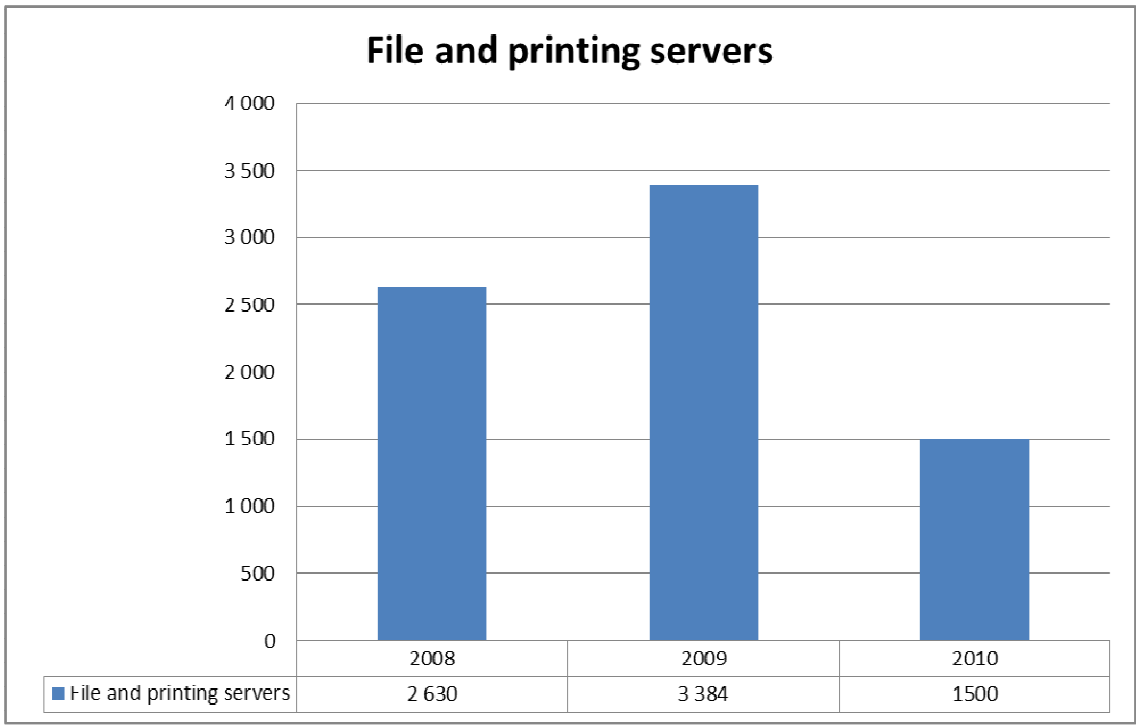


Chart 1a. File and printing servers in the Finnish government (Valtionvarainministeriö 2011 p.45)

There were also 6 661 database and application servers in 2008. There was an increase of 709 servers in 2009, bringing the number in to a total of 7 370 data and application servers. The additions in 2009 come from the administrations of the Ministry of Finance, the Ministry of Education and Culture and the Ministry of Employment and Economy. In 2010 there were 4 800 database and application servers; the drop is mainly due to the servers of the universities (2 600 servers) being no longer taken into account. Chart 1b, Database and application servers, shows these figures in a diagram with the server numbers attached. (Valtionvarainministeriö 2011, p.45)

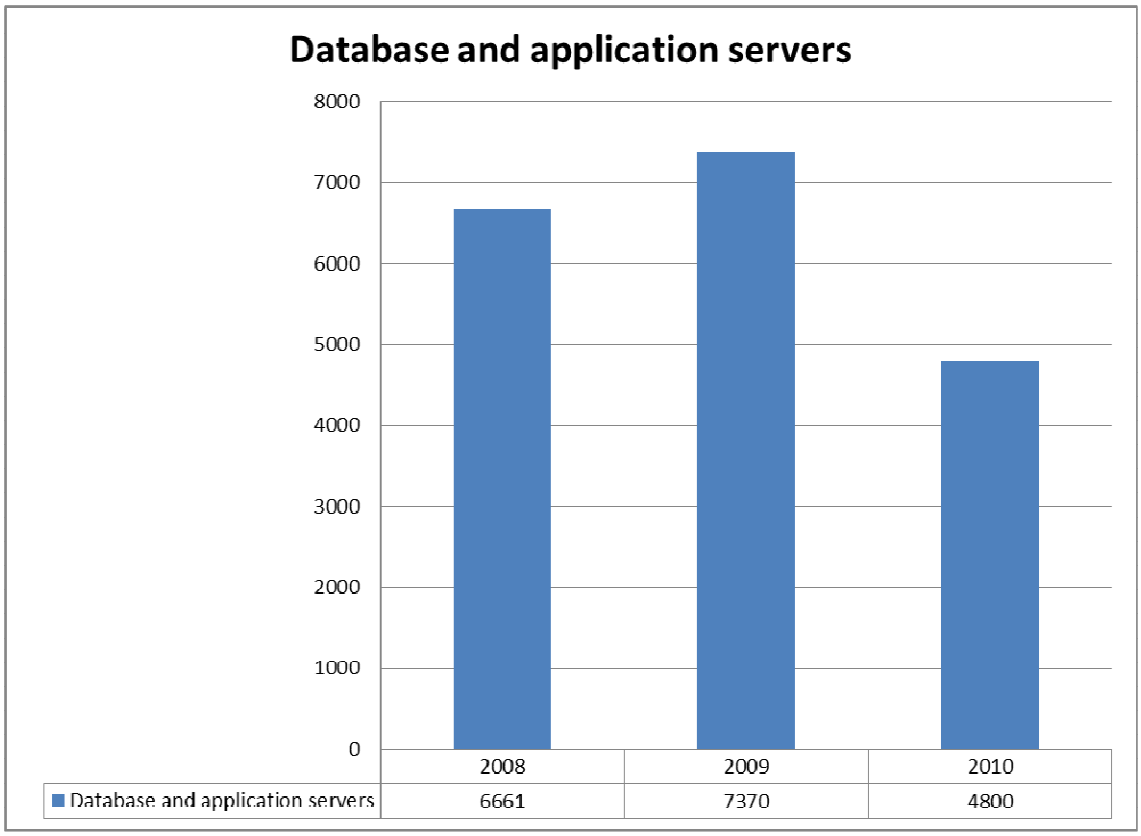


Chart 1b. Database and application servers in the Finnish government (Valtionvarainministeriö 2011, p.45)

In 2008 there were 1 592 virtual servers. In 2009 the number nearly doubled to 3 235 servers and in 2010 the amount decreased to 2 446 servers, because of the 1 200 virtual servers of the universities are no longer taken in to the calculations. These figures can be seen in chart 1c, Virtual servers. If the virtual servers of the universities are not taken in consideration, the number of virtual servers has increased. (Valtionvarainministeriö 2011 p.44)

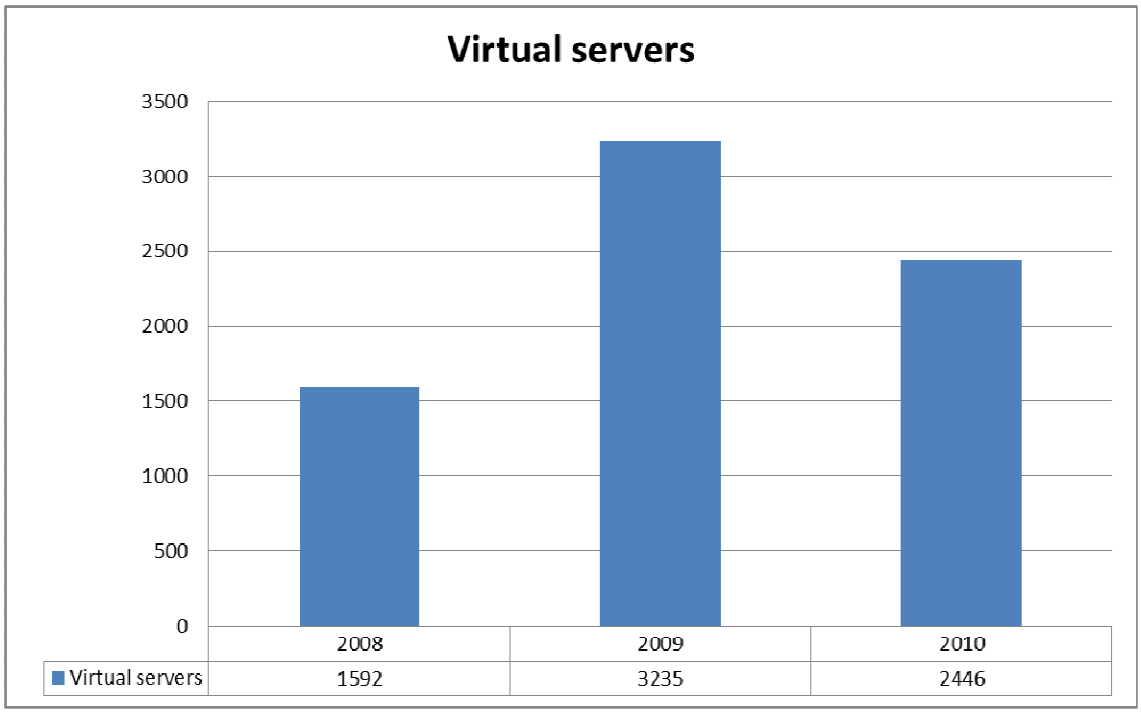


Chart 1c. Virtual servers in the Finnish government (Valtionvarainministeriö 2011 p.44)

ITC spending has increased by 13% from 2008 to 2009 and 14% from 2009 to 2010 when taken in to account the separation of the universities from the government. (Valtionvarainministeriö 2011, p.21 & 42)

4.3 Comparison with example countries

Comparing Finnish government ICT with the example countries helps to understand how different the governments, practices and the infrastructures are between these countries. My calculations are shown in chart 1. According to it, the Finnish government spends the most money on ICT per capita, compared to the UK and the United States of America.

ICT budgets per capita			Chart 2
	UK	USA	Finland
Population(M)	62	309	5,4
ICT budget(M€)	18000	52000	2100
ICT budget per person (€):	290,3	168,3	388,9

Chart 2. ICT Budgets per capita

Although the USA has the biggest budget of these three example countries, Finland's budget is still more than two times that, when the budget is divided by the population. This verifies the claims of Finland being an information society, but it gives also a reason why Finland's government should implement cloud computing. According to my calculations, if the UK aims to save 20% of its annual ICT spending, this would mean, in theory, that it would be possible for Finland to save at least the same amount of money; in this case the 20% would mean savings of approximately 420 million euros in a year.

4.4 Summary

In proportion to the population, the government of Finland has the biggest IT budget when compared with the two western example countries. The server numbers are increasing continuously, which means also higher electricity consumption, higher maintenance costs and other costs, which makes the ICT in Finnish public administration an ideal market for cloud computing. There is no sense in purchasing new equipment when there is such an opportunity as cloud computing. At the moment the administration of the governmental ICT is scattered to the ministries and bureaus, which is one reason why the Management Unit of Government IT Operations was established, to conduct the IT operations and projects centrally. There is a lot of market potential for cloud computing in the public administration of Finland, but the awareness of cloud computing needs to be increased in order to make it successful. The exploratory research, that the Management Unit of Government IT Operations has started to plan will take place in the future and it will help the Management Unit of Government IT Operations to find out if there is a will and possibility for the public administration to launch such cloud computing projects as in the UK, the USA and Japan.

In Finland there are some law-based limitations to sharing information. (For example Henkilötietolaki 523/1999, Laki tietoyhteiskunnan palvelujen tarjoamisesta 458/2000, Sähköisen viestinnän tietosuojalaki 516/2004, Laki yksityisyyden suojasta työelämässä 759/2004 and Laki sähköisestä asioinnista viranomaistoiminnassa 13/2003.) The model applied in the USA could not be

ideal for Finland, where the information is held by the private sector. The ICT infrastructure in Finland is not as developed as in Japan, but in Finland there are still lots of people with ICT skills and a lot of potential for the ICT industry. The G-Cloud in the UK is very solid and straightforward, building large data centers and keeping the information within the country's borders. (Heino 2010, p. 99)

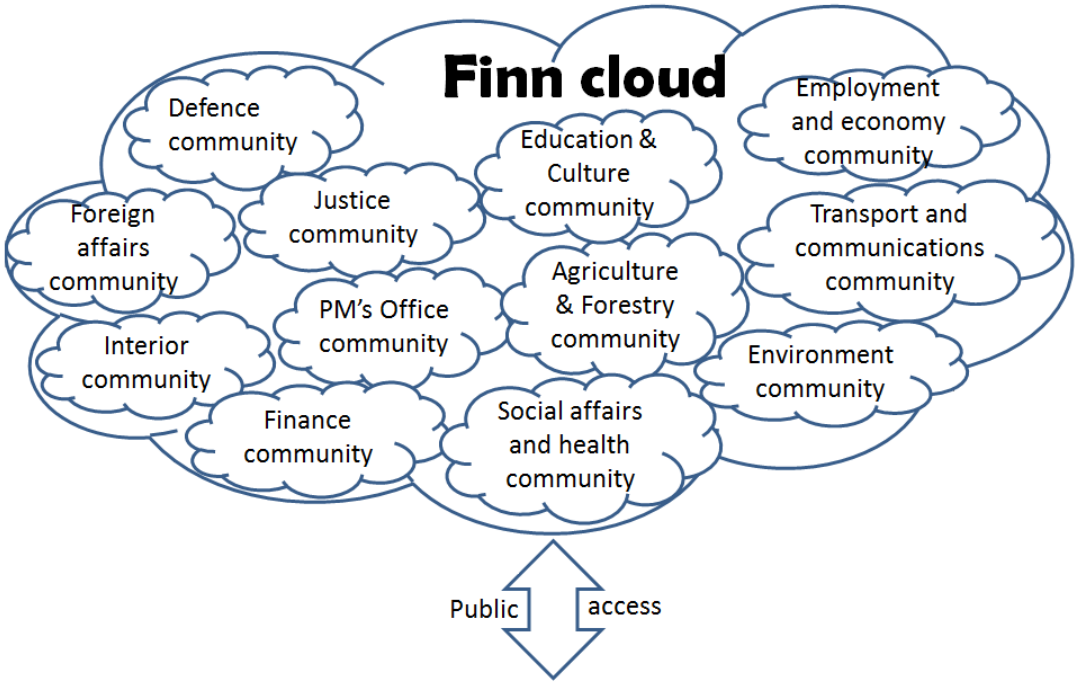
The benefits of cloud computing for the governments are very similar to the benefits and advantages for the companies and organizations in the private sector. Using cloud computing offers a large variety of benefits in itself but it also creates an opportunity for new market opportunities to be born. For example the Information and Transport Ministry announced that the information that is produced using public finances should be made available for everyone and for free of charge. This could result in developing network applications that benefit the citizens, and companies could sell information refining services for their customers. Schools would no more suffer from aging ICT equipment, because to use cloud computing, only light machinery is needed. These are just a few examples of the innovations and benefits that could be gained if cloud computing would be implemented for use in the government in maximum scale and scope. (Mäkinen 2011)

Because cloud computing is a new approach to ICT, it should be carefully tested, monitored and analyzed first before fully implementing cloud computing in any organization. Cloud computing should also be seriously considered to be taken in to use in public administration, because it is the large organizations that benefit the most from using it.

5 CONCLUSIONS

An ideal model for Finland could be something between the Japanese Kasumigaseki cloud and the British G-Cloud, keeping the data in the country and exploiting the developed ICT infrastructure that there is and, in time, develop it to include also other parts of the public sector, for example hospitals,

schools etc. A hybrid cloud, “Finn cloud” is shown in picture 3. The public would be able to access the data, which is made available for the citizens in the public cloud and the private cloud would be used by the public administrations. In picture 3, Finn cloud, the smaller clouds inside the Finn cloud indicate that there should be standardized applications for similar organizations, but there should also be a different approach concerning totally different types of communities, for instance traffic vs. forestry or defense vs. justice. For this purpose there could be an application “shop” where the users could choose what type of applications they use. If the laws would allow it and it is seen viable, the government could also do the same thing as has been done in the USA: non-vital services could be outsourced, to be taken care of by the private sector, which would increase the costs savings even further.



Picture 3. Finn cloud

Cloud computing markets are relatively new and they are still developing. In order to gain the numerous advantages, benefits and opportunities, cloud computing has to be examined and tested to see its effects and to develop the technology and practices even further. There are still many challenges that limit the usage of cloud computing, such as the law-based limitations in Finland and

also some technical and practical issues. To overcome these challenges, the public administration needs to see cloud computing as an opportunity, not as a momentary trend. The first step to take is to get the government officials familiarized with cloud computing.

The example countries see cloud computing as the future path in ICT development, which is why they have such significant cloud computing plans and projects. Because cloud computing is a relatively new approach, the practices, technology and implementations need to be monitored, tested and improved to make it work perfectly. Only after that a full scale usage is rational.

In the public administration of Finland, cloud computing is not familiar to the employees, and if some ministries or departments are using cloud computing, they are not doing it centrally. Only by conducting cloud computing in a centralized manner can the public administration gain the full benefits of it. Since the centralized conducting of government ICT actions is still in the beginning of its path, one can only wait for the results of the exploratory research work by the Management Unit of Government IT Operations and the decisions made according to the results.

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