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# CLOUD COMPUTING: DIFFERENCES IN APPROACH BETWEEN LARGE ORGANIZATIONS THAT USE CLOUD COMPUTING AND PROVIDERS OF CLOUD SERVICES IN THE NETHERLANDS

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# **CLOUD COMPUTING: DIFFERENCES IN APPROACH BETWEEN LARGE ORGANIZATIONS THAT USE CLOUD COMPUTING AND PROVIDERS OF CLOUD SERVICES IN THE NETHERLANDS**

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## **Abstract**

*This article compares the opinions on cloud computing of five large organizations that demand cloud services to the opinions of five major providers of these services in the Netherlands. This concerns opinions on the definition of cloud computing, on the legislation that is important to them, on the business case for cloud computing and on the organization and governance of cloud services. It draws the conclusion that the large organizations that use cloud computing view cloud computing as an evolution in the delivery of ICT. Suppliers often put an emphasis on public cloud services and view this as a revolution in the delivery of ICT. As regards the legislation, suppliers focus on supranational legislation, whilst these cloud users stress compliance with national legislation. The large organizations investigated often have only just started procuring public cloud services. In this early phase considerations of return on investment and risk play a major role. Besides, suppliers also mention other aspects to procure cloud services, as for example trust. Finally, governance and organization of the procured cloud services seem to require attention both on the user side as well as the supplier side.*

*Keywords: definition of cloud computing, legislation surrounding cloud computing, the business case for cloud computing in large organizations.*

# 1. INTRODUCTION

In 1997, Chellappa (Chellappa & Gupta, 2002) was the first to define the term cloud computing as “a computing paradigm where the boundaries of computing will be determined by economic rationale rather than technical limit.” The term cloud computing is relatively new and talked about by many people (Ahronovitz et al., 2010). There is a discussion on what cloud computing exactly comprises. Some even state (Aymerich, Fenu & Surcis, 2008) that cloud computing is a poetical term. However, there are currently worldwide “clouds” that consist of concentrated storage and processing capacities that are set up in datacenters. These centers provide cloud services 24 hours per day, 7 days per week, during the whole year using the internet amongst others.

This article investigates what the differences are between the views of those that demand cloud services and those that supply these services in the Netherlands. The method chosen for this is to list the opinions of large organizations. Large organizations that use cloud computing (Buyya et al., 2009), are namely reticent when introducing cloud computing for reasons of legislation. But these large organizations, where one can often encounter quite a variety of IT support, will be increasingly confronted (Sterling & Stark, 2009; Grossman et al., 2009) with larger datasets, meaning that the necessity for high performance computing by means of cloud computing increases. Furthermore, Mell & Grance (2009) expect that there will be an evolution of in-house datacenters in large organizations towards private clouds, meaning that hybrid clouds will be developed for them. How does this apply to large organizations in the Netherlands and how do providers of cloud services respond to this?

This article consists of two parts. The first part provides the theoretical background of the article. The definition of cloud computing as used in the article is determined. The reason for the importance for giving attention to the legal aspects of cloud computing is explained. Views on the business case for cloud computing are summarized and the possibilities for governance and organization of cloud computing services are listed. In the second part, the opinions of the large organizations that participated in this research on these aspects are presented and evaluated.

## 2. THE THEORY BEHIND CLOUD COMPUTING

### 2.1. Definitions for cloud computing

There are various types of definition for and perspectives on cloud computing. In general, there is a distinction between definitions that focus on the objective of cloud computing, definitions that focus on the various components of cloud computing, and definitions that comprise both the objective as well as the components of cloud computing.

Examples of the first category are the definitions as given by Vaquero et al. (2009) and Catteddu & Hogben (2009). Vaquero et al. (2009) state for example: “*Clouds are a large pool of easily usable and accessible virtualized resources (such as hardware, development platforms and/or services). These resources can be dynamically re-configured to adjust to a variable load (scale), allowing also for an optimum resource utilization. This pool of resources is typically exploited by a pay- per-use model in which guarantees are offered by the Infrastructure Supplier by means of customized SLA's.*” When there is more emphasis on the components of cloud computing (Armbrust et al., 2009; Leavitt, 2009),

then one arrives at a definition such as in Leavitt (2009): *“At their most basic, cloud computing suppliers’ infrastructures consist of Internet-connected servers, at one site or distributed across several locations, that host applications and data. They also include virtualization, grid, management, database, and other types of software; user interfaces; APIs; a communications infrastructure for connecting to users over the Internet or a private network; and a usage monitoring and billing mechanism.”*

The last type of definition describes both the objective of cloud computing as well as its components. An example of this is the definition of the American National Institute of Standards and Technology (NIST) (Mell & Grance, 2009). This states: *“Cloud computing is a model for enabling 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 supplier interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.”*

This last definition is the most complete definition of cloud computing and therefore will be used in this study. This definition distinguishes between clouds and the provision of services from the cloud. One of these services is for example the service known as Software as a Service. The distinction between cloud and cloud services is important because the geographical location of the cloud determines which law is applicable for storage and processing of data by the cloud. In addition, the NIST definition distinguishes in its description between private and public cloud. Private clouds provide services to a specific organization. Public clouds supply services that are the same for all organizations that buy their services.

## **2.2. Legal aspects of cloud computing**

In cloud computing, one may have to deal with private law and public law. Both fields will be discussed. In private law, there is a distinction possible between specific contracts and standard contracts. In private clouds, the procurer and the supplier of cloud services often conclude a specific contract, which is tailored to the situation and in which the relationships between parties are laid down. When using public clouds, the supplier often provides standard subscription based services. This is often a standard contract. When cloud services are provided on the basis of a contract, then this concerns an external supplier of cloud services for that customer. When there are agreements between internal parties within an organization, then the agreements between the demanding organization and the internal supplier of cloud services will be laid down in an SLA only (Thiadens, 2008). Nicholson (2009) remarks that, when procuring these cloud services, one needs to pay attention to:

- privacy issues. Regarding this it is important to be aware of the fact that the data may be stored in a cloud, which is located in a different country and that the privacy laws of the country where the cloud is situated are applicable.
- issues regarding licences, such as liability and quantities;
- issues regarding flexibility, such as scalability, price and services;
- stipulations regarding the termination of the services, in which migration and the occurrence of lock-in deserve attention.

Regarding the public law, Gellman (2009) remarks that:

- Cloud computing does have effects on the privacy of personal details and the confidentiality of organizations' data. The protection of personal data may vary. Furthermore, it is dependent on the conditions for service provision and the privacy policy of the cloud provider.
- For some kinds of information and certain types of users of cloud computing, the situation changes with regard to the rights to privacy and confidentiality of the customer as well as the obligations of the service provider in this field, should the latter decide to move the information of these users.
- Cloud computing suppliers may be duty bound by authorities. Governments may oblige them to provide information and to actively check files on criminal activities.
- Authorities' laws are sometimes running behind. Current legislation can it make hard for cloud providers in other countries to protect themselves against hackers or to fight hackers by order of their customers (Smith, 2010).

Furthermore, countries may have laws that oblige organizations to use specific cloud providers. For example in some countries it is not allowed to store tax or health data of its citizens outside the country. Legislation may also result in a cloud provider being less protected against the supply of data to third parties. Finally, cloud computing leads to questions regarding taxes in both the country of the provider of the services as well as the country of the organization demanding services (KPMG, 2010). This concerns questions regarding appropriation of profits, the payment of value added tax and the imposing of advance levies.

### **2.3. Business case and implementation**

Donkers (2011) researched the scientific literature on opinions about the advantages and disadvantages of cloud computing and the risk incurred by cloud computing. Based on his research, he states that the reasons for applying cloud computing are mainly of a financial nature. Cloud computing decreases the cost and the investments needed for IT support. The main technical reason is the scalability of cloud computing. In other words, being able to scale up or down cloud services quickly and easily. Furthermore, the access to services that were previously inaccessible (through technical or financial impracticability) does play an important part.

The main risks when applying cloud computing appear to be the operational risks such as for example the reliability of the service level agreements (SLAs) of the cloud provider regarding availability, the accessibility of the cloud, its performance, the ability to scale up the IT support regarding volume and the ability to restore the cloud service sufficiently quick. The impossibility of physical governance is also seen as a risk and thus a reason for not applying cloud computing. Besides, aspects such as privacy, security and contingency prove to be major points of attention. These aspects form a risk in the application of cloud computing and may be considered a reason for not using cloud services. The latter is confirmed by a study performed by the analysts of research agency IDC in 2008 (Grens, 2008). From this study it emerges that almost 75% of the interviewed IT managers and Chief Information Officers view security as the main challenge regarding the adoption of cloud computing.

### **2.4. Governance and organization**

Mather (2010) indicates which processes have to be set up by a cloud computing customer. In doing so, he distinguishes between the type of cloud service that is purchased and the type of cloud that

provides this service. In his opinion, customers of Software as a Service (SaaS) services have to have processes in the following fields at their disposal:

- the field of security;
- the field of monitoring and
- in the field of service desk and incident management.

When procuring other services such as for example Platform as a service (PaaS) , the organization may become more extensive as the use of these services require more tailoring. The set-up of these processes at the demand side of cloud services is discussed by Op den Brouw (IBM, 2010). Op den Brouw advises organizations to arrive at an integration between the organization for cloud computing and the existing processes in ICT service management. The integrated organization, as far as cloud computing is concerned, will have to give extra attention to availability management, capacity management, financial management and suppliers management. In Op den Brouw's opinion, an organization using PaaS and IaaS services:

- works with a catalogue of services and therefore has to set up service catalogue management;
- has service level agreements per service per customer and therefore has to have service level management and financial management processes;
- procures the services themselves and therefore has the following processes:
  - o Service request fulfillment,
  - o Service asset and configuration management,
  - o Service desk, incident and problem management,
  - o Change management and release management,
  - o Availability and capacity management,
  - o IT financial management, and
- if necessary, has additional processes for operations, e.g. an in-house Office environment for which additional processes are set up.

When using cloud services, the supplier periodically provides the customer with information. In using private clouds these reports often indicate the use of services precisely. In using public cloud services, standard reports are supplied. In addition, the customer of cloud services may decide to have the supplier audited. The providers of cloud services decide to what extent they allow external audits and how the reports of these audits are dealt with.

### **3. RESEARCH QUESTIONS AND APPROACH OF THE STUDY**

The research questions were aimed at mapping the differences in opinion between those that demand for cloud services and those organizations that supply these services. These differences were concentrated on the following subjects:

- What definition does your organization use for cloud computing?
- What does your organization consider the main legal aspects of cloud computing?
- What is the business case for cloud computing?
- In your opinion, how should the governance and organization of cloud computing be set up?

The study was carried out by means of in-depth interviews that each lasted for approximately 1.5

hours. These interviews took place in the period between November 2010 and February 2011. These interviews consisted of a list of open questions. Five large organizations that use cloud computing services were interviewed on the basis of a standard list of questions. The following organizations took part in the study: the University of Amsterdam, the InHolland University of Applied Sciences, the Gelderland Midden Police force, NXP semiconductors and DAF trucks. Each of these organizations has more than 4,000 employees. In addition, five suppliers of cloud services were interviewed. These five were Microsoft, Google, IBM, Accenture and AFAS. AFAS is a Dutch supplier of online ERP applications.

The interview questions were phrased by the knowledge circle of the IT governance lectureship of the Fontys University of Applied Sciences. The interviews were held by five groups of 4th year students. Each group interviewed an organization that uses cloud computing services as well as an organization on the supply side. The students were trained by going to lectures and by means of trial interviews. The trial interviews were conducted both with the members of the knowledge circle using case studies and with the manager of the private cloud of the Fontys University of Applied Sciences.

## **4. RESULTS OF THE STUDY**

### **4.1. The differences in opinion regarding cloud computing definitions**

Figure 1 shows the opinions of those that demand and those that supply cloud services. Figure 1 demonstrates that cloud computing suppliers mainly view public cloud service as the predominant way of supplying cloud services. Google remarks explicitly that they do not provide tailor-made solutions. Microsoft remarks that cloud computing is a new delivery model, where services are sold at subscription fees. In fact, this means that suppliers focus on the public cloud side of the NIST definition. This entails the provision of standard services on the basis of standard contracts and service agreements.

This clearly differs from the views of those that demand cloud services. Large companies such as truck producer DAF and chip manufacturer NXP use private cloud solutions. Large universities such as the InHolland University of Applied Sciences and the University of Amsterdam regard cloud computing as one step further in the thinking about sourcing of ICT. The demand side looks at cloud computing as an evolution in computing. They have their own centers (the police force) or their own private cloud or a private cloud elsewhere and start to procure public cloud services. To them, the entire NIST definition of cloud computing is applicable with for the time being, an emphasis on private cloud computing.

### **4.2. The differences in approach to the legal aspects of cloud computing**

With the exception of AFAS, a provider of ERP online service that mainly operates in the Netherlands, suppliers of cloud computing services do think, when thinking about the legal aspects of

Who?	Microsoft	Google	IBM	Accenture	AFAS
<b>Subject:</b>					
Definition:	Cloud computing is a new delivery model which sells services at subscription fees. All services can be purchased per user per month.	A cloud service is a hosted application or is provided via a platform built in a shared infrastructure and delivered via the web.	Public cloud makes use of services that are somewhere on the internet and where one pays per service.	Cloud computing is seen as replacement of the current applications. Everyone can use the services and there are many applications.	AFAS online is a windows application that can be called via a terminal. It is a Public SaaS provision.
Distinction between cloud services:	Microsoft provides all services worldwide from computer centers in Europe, Asia and America. Not every service is provided everywhere.	Google provides services from a public cloud and does not provide anything tailor-made.	IBM provides complete solutions for organizations. These are public, private or hybrid solutions.	Clouds are the resources and cloud services are provided in conformity with an SLA to a customer.	It makes a correct distinction between resources and services.
Who?	InHolland	University of Amsterdam	Police, region Midden-Nederland	DAF	NXP
<b>Subject:</b>					
Definition:	Cloud computing is a sequel to virtualisation. It involves an organization asking itself which tasks it really wants to perform in-house	Cloud computing is an extension of outsourcing. One does sacrifice some flexibility.	Not knowing where the data and the applications are. Approach to ICT facilities via the internet.	Cloud computing is outsourcing of the exploitation of ICT, not knowing where one's data is kept.	The definition is the one by Gartner: "Style of computing, in which ICT application is provided as scalable and flexible service via the internet."
Use of cloud services:	live@edu, Microsoft mail, absence registration (all public cloud applications)	The University currently checks out student email. Researchers have freedom and use cloud services	At the Police force everyone still knows where data and applications are: that is not a cloud. In the long run towards a hybrid cloud.	One has a hybrid cloud. DAF has its own sharepoint servers. The business systems use the ATOS computer centres.	Private cloud is computer center hosting. In addition, NXP uses public cloud services, particularly IaaS and PaaS.

Figure 1: The different views of demand and supply on the definition of cloud computing.

cloud computing, strongly above national level. Microsoft states it has to comply with the legislation of the countries where it supplies services as well as with the legislation between these countries. Google states that its data storage facilities comply with the Safe harbour act. IBM states that it builds computer centres all over the world in order to be able to comply with the privacy laws. With regard to the check on compliance with legislation, reactions vary. In general, people expect laws to be amended because of the advent of cloud computing.

Those organizations that demand services also speak strongly from their own perspective. Universities and the police force put a strong emphasis on compliance with the national laws regarding protection of people's personal privacy. Those that demand cloud computing clearly consider the observance of legislation important. Apart from this, their opinion on future legislation is no different from the opinion of those that supply cloud computing services. One also indicates to expect legislation in connection with cloud computing. However, it remains unclear whether this will be national or imposed by the European Union.

In this field, both demand as well as supply focuses on legislation with regard to personal privacy. Regarding this, the suppliers are more internationally oriented than the demand side. This emerges from their focus on legislation at EU level in Europe or federal level in the USA.

Who?	Microsoft	Google	IBM	Accenture	AFAS
<b>Subject:</b>					
Legislation:	Microsoft has to comply with the legislation of all countries and with the agreements between countries, e.g. the Safe Harbour act. For that reason it is in constant dialog with USA and EU.	Google does not do tailor-made solutions. One does not have access to the place of hosting. Personal data may be anywhere, provided compliance with the Safe Harbour Act.	Especially the laws in the field of privacy are important. IBM therefore builds cloud computer centres in specific countries to comply to their rules.	The applicable legislation differs per customer. Accenture verifies this for its customers. The fine for non compliance may vary per country. Sometimes it is a lump sum per violation.	Customers are responsible for their own data. AFAS only supplies in the Netherlands, Belgium and Curacao. Data is stored separately per country. This can be moved at the customer's request.
Check on compliance:	The check on compliance is often organised per sector, such as for example that of the Nederlandse Bank.	Check by body that checks compliance Safe Harbour Act (USA department of commerce)	Quarterly checks on compliance by means of: -peer reviews; -in-house audits; - external audits	Check on compliance is a responsibility of the organization in question itself.	Check are performed by the customer and AFAS has various certifications.
Expectation regarding future legislation:	Amendment of the Dutch /worldwide legislation for working with cloud computing.	n/a.	The EU rules and guidelines in the field of privacy and cloud computing become important.	As yet, legislation is often lagging behind. Politicians are not interested in cloud computing.	Laws with regard to cloud computing and its services are expected.
<b>Who?</b>	<b>InHolland</b>	<b>University of Amsterdam (UvA)</b>	<b>Police, region Midden-Nederland</b>	<b>DAF</b>	<b>NXP</b>
Legislation:	One has to deal mainly with the following laws: Personal Data Protection Act and the Computer Crime Act.	Legislation determines the place where data is stored. European legislation stipulates that the data remains in Europe.	Legislation computer crime, legislation protection personal data.	Personal Data Protection Act, Safe Harbour Act. In the Netherlands mainly the Computer Crime Act	General legislation, privacy legislation, EU privacy legislation, export checks and financial legislation.
Check on compliance:	Administrative Affairs and governance board check on compliance.	Checks takes place by means of audits by the security officer.	Check: every two years the inspection Public Order and Safety performs an audit.	DAF organises this internally plus an external audit on compliance. To this applies policy per country mainly regarding safety of information and norms for cloud	The checks are conducted by internal and external audits.
Expectation regarding future legislation:	Legislation in the field of authorisation, authentication and about the place of the data	More regulation of cloud computing.	Regularisation of cloud computing at EU level is expected		Especially with regard to privacy, legislation at EU level becomes more strict.

Figure 2: The opinions on legislation as stated by demand and supply of cloud computing.

### 4.3. The opinions on the business case for cloud computing

Figure 3 shows that the suppliers of public cloud computing services regard 2007-2008 as the early years. In the year 2011, just about everybody uses a cloud service. One states that the reasons for this are flexibility, always having the latest version of software available and pay as you go for using the service. Only two suppliers remark that the costs of the cloud services are an argument.

The reasons behind the business case vary more amongst those that demand cloud services. Industrial companies DAF and NXP, both using private cloud services, remark that they look at every service in a structured manner. Cost, risk and functionality are the clinching factors with regard to this. For the universities and the police force, functionality and development are the main things.

These conclusions only partly correspond with the theory. With regard to this, Donkers (2011) states that the business case for cloud computing mainly lies in the financial field and that scalability of the service provision is also important.

Who?	Microsoft	Google	IBM	Accenture	AFAS
<b>Subject:</b>					
Start delivery cloud computing.	Started in the consumer market in 1995 with hotmail and MSN. In the business market in 2003 with Livemeeting. Since 2.5 years with SaaS, PaaS and IaaS.	Google started in 1998. It offers: -Google search; -Google adds and -Google apps. The Google world does not use releases. Every day the functions of the cloud are adjusted and extended.	Started providing cloud services in 2008: Cloud computing is a new stage in the provision of ICT.	Accenture is setting up a cloud service based on Oracle products. It will be an HRM solution based on SaaS.	Per 1/1/2009, AFAS has started with AFAS on line. Today, the AFAS ERP package can be procured as a service.
Considerations:	Real reason: flexibility and always the latest version of the software. Customers pay for services , not for hardware, software and maintenance.	Scalability, which entails benefits in cost; - it is very safe; -availability many times better than stand alone system updates.	Cost, controllability and speed of the availability of a service. One sees savings of 50%	The costs and reliability of the service provision.	Technical and operational reasons. Most customers wish to have cares taken care of and pay for it.
Who?	InHolland	University of Amsterdam (UvA)	Police, region Midden-Nederland	DAF	NXP
Use of cloud computing.	Live@edu starts per February 2011. Agreements were made with other educational institutes.	Currently fairly advanced in the process of transferring student mail In May/June start using.	Heading for three private computer centres. In the future also use of mash-up's such as Google maps, Twitter	Hosting of the main frame by a third party.(private cloud) This already happens over ten years.	Using of a private cloud. Started with HRM and slowly implemented <b>outsourcing all IT bottom up.</b>
Considerations:	1.Minimally same functionality. 2. Costs now and in future 3. Authentication of the supplier works. 4. and afterwards continued development to more possibilities.	Everything standard that can be done externally can be outsourced.	Effectivity and efficiency at minimum risk and compliance with legislation.	DAF sees per service whether there is a positive ROI and acceptable risks.	A checklist was developed, which enables checking whether a service has a certain level. Main considerations are cost and functionality.
Future :	All storage and processing in the cloud.	Not considered yet to outsource the entire computer centre. Student mail comes first.	Police cloud with use government cloud and services from the public cloud.	Really weighed up per situation	Weighed up per situation

*Figure 3: Business case for cloud computing.*

#### 4.4. The opinions on governance and organization of cloud computing

Figure 4 shows a few aspects of the governance and organization of ICT at the supply and at the demand side. It becomes clear that cloud computing is provided as a service by the suppliers and that they give their customers, who have little influence, limited insight into the organization surrounding this supplier. At Google, a dashboard shows the customer what the changes are. At AFAS, one is able to ask for data and there are customer participation sessions. Microsoft has a partner council and a customer advisory board. And sometimes, one provides insight into the external audits that have been performed on the organization.

For those customers that have worked with private clouds for a while, it has been clearly laid down in contracts in which manner the supplier of private cloud services reports. In public services, one uses the standard facilities. In the other three organizations there is clearly governance of the

Who?	Microsoft	Google	IBM	Accenture	AFAS
<b>Subject:</b>					
Important processes: in processes:	For all cloud services there is just a 2nd line service desk. Customers take care of the 1st line monitoring for Microsoft.	There is a dashboard where one can see, which changes have been made.	Apart from management of cloud services by IBM, the customer performs a few tasks.	Accenture has a framework of processes based on ITIL.	Mainly processes at the AFAS side. AFAS reports about incidents but not on availability.
-governance internal cloud	The tactical and strategic processes for delivery and products of cloud services	no public information about this governance available.	no information given.	Reports of the implemented processes.	There aren't really any reports. These are based on requesting data.
-governance external cloud supplier	Microsoft has a partner and a customer advisory board. Every six months, customer satisfaction is measured. Reports are via a dashboard 24*7 available.	own account administrator.	governance strongly depends on the customer and their demands. IBM reports on line to its customers.	Via the Accenture framework, many service management and production management processes are set up and these are reported on.	For customers, there are participation sessions. Furthermore, there is one account manager per customer.
- access audits	unknown	no.	Yes, in external audits	not applicable	There are SLAs. Start with audits.
<b>Who?</b>	<b>InHolland</b>	<b>University of Amsterdam (UvA)</b>	<b>Police, region Midden-Nederland</b>	<b>DAF</b>	<b>NXP</b>
Processes set up:	monitoring and management still under development.	attention required for functional management	in regions there is information management at different levels.	monitoring and clear demands to reports that are laid down in contracts.	monitoring and clear demands to services via contract.
Governance internal cloud	information strategy board with governance groups.	via governance boards The Board of Directors collates the advice.	via national CIO.	not applicable	not applicable
Governance external cloud supplier	still busy designing this.	Currently, much consultation, later regular consultation.	not applicable.	via contracts	via contracts
Access audits	wish	Unknown	not applicable.	Yes	Yes
Termination of the service and movement of data to other destination:	In SLA with Microsoft there are stipulations regarding this; currently, done ourselves: so can be moved	Yes, the possibility of relocation is enforced in the contract.	Not applicable. (n/a)	Clear cut exit criteria in the contract. Moving only with knowledge and permission of DAF.	In public clouds one can immediately (Amazon) or after a short while (Sales force) be out.

Figure 4: Governance and organization of cloud computing.

own internal cloud. As far as the governance of external clouds is concerned there are consultations. In contracts, a possible exit is a factor.

It is clear that to both the organizations that demand cloud services as well as to the suppliers of these services, it is important that there are possibilities available for tracking the use of the cloud services. Furthermore it becomes clear, that universities in the Netherlands are at the initial stage of using cloud services. The development of processes for public cloud services in the field of security, the field of monitoring and in the field of service desk and incident management, as formulated by Mather (2008) for the supply and demand of Software as a Service, often do not seem to have left the development stage.

## 6. CONCLUSIONS

The study defined four research questions. These questions concerned the differences in opinion between the organizations that demand and those that supply cloud services. The demand side consisted of five large organizations. The study shows that:

- in the field of the definition of cloud computing, suppliers view public cloud computing as the true cloud computing and consider this as a completely new business model for the provision of IT services. Public cloud computing implies the delivery of standard services on a standard contract. The user has to accept the service as such. He can only negotiate on its price. On the demand side, companies do not notice a revolution in IT service provision. They consider cloud computing as an evolution in computing.
- as far as the legal aspects are concerned, those that demand and those that supply cloud computing share the view that there is a need for better laws regarding this. With respect to this, the suppliers mainly place their hope in the issuing of regulations by above national organizations such as the European Union.
- with regard to the business case, the opinions of both demand as well as supply do diverge from the opinions as found in professional literature. The in this study investigated organizations put more emphasis on flexibility in the choice of cloud computing and less on the financial aspect.
- in the field of governance and organization of cloud computing one may ascertain that suppliers are often a little further advanced than the demand side. Governance and external influence on that governance varies but is only minor in public cloud computing. Sometimes, one gets insight into external audits.

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