Journal of Communication and Computer 9 (2012) 813-823

Will Cloud Computing Change Standards in IT-Service Management?

Marc Jansen

University of Applied Sciences Ruhr West, 46240 Bottrop, Germany

Received: November 21, 2011 / Accepted: December 23, 2011 / Published: July 31, 2012.

Abstract: One of the latest hypes in IT is the well-known cloud computing paradigm. This paradigm that showed up in recent years is a paradigm for the dynamic usage of computational power, memory and other computational resources. With respect to hypes, the author strongly believes that the cloud computing paradigm has the potential to survive the hype and to become a usual technology used for the provision of IT based services. Therefore, it will be necessary to deploy cloud computing based infrastructures in a professional, stable and reliable way. This would lead to the idea that the cloud computing paradigm needs to be concerned with respect to IT service management, since cloud based infrastructures have to be managed differently in comparison to a usual infrastructure. This paper discusses, based on the ITIL (IT infrastructure library), as the de-facto standard for IT service management, whether this de-facto standard might also be able to manage cloud computing based infrastructures, how the according processes might change and whether ITIL supports a division of labor between the customer and the service provider of a cloud computing based infrastructure.

Key words: ITIL (IT infrastructure library), cloud computing, infrastructure, services, processes.

1. Introduction

In recent years a new approach for the dynamic usage of computational power, memory and other resources comes into play: the cloud computing paradigm. The term “cloud computing” was first used very frequently without an exact definition of what cloud computing actually is. This changed as the NIST (national institute of standards and technology) presented a definition of the term cloud computing [1, 2]. This new approach provides a paradigm that allows to dynamically provide computational resources, e.g. computational power, memory, … and is therefore especially interesting for IT service providers. Since cloud based infrastructures have to be managed differently in comparison to usual IT infrastructures, a closer look towards a practical approach of IT service management [3] with respect to cloud computing is necessary.

Corresponding author: Marc Jansen, Ph.D., professor, research field: mobile and distributed systems. E-mail: Marc.Jansen@hs-ruhrwest.de.

On the other hand, IT service management is a topic of interest for quite a while already and the ITIL (IT infrastructure library), as its de-facto standard, is already available in version 3. Nevertheless, this version does not yet deal with the specialities that need to be concerned with respect to cloud computing.

Therefore, this paper discusses on the basis of ITIL which processes needs to be concerned especially for the topic of cloud computing.

After a short explanation of cloud computing specific terms and a short introduction into the ITIL theory, a discussion of certain ITIL processes and their importance with respect to cloud computing are presented, along with the discussion of impacts that cloud computing will have on the current status of IT Service Management.

Currently cloud computing still is in a hype phase. Usually there are two different kinds of technologies in a hype. On the one hand there are technologies that survive the hype, and on the other hand there are technologies that do not survive the hype and almost

suddenly disappear. The author strongly believes that cloud computing has the potential to be one of the technologies that survives the hype. Technology that survives its hype often faces the problem that the transition from the hype phase to a standardized and reliable technology is problematic. Within the hype phase, the technology is often used by technology enthusiasts. They usually use the technology primarily for the sake of it. The transition into a standardized and reliable technology is necessary in order to being able to deploy IT based services in a large scale in a cloud computing based environment. Here, a professional service strategy is necessary in order to provide cloud based services for large scale production usage. Therefore, this paper presents an approach how the de-facto standard of IT-Service Management might change with the standardization of cloud computing.

1.1 Short Introduction to cloud computing

Cloud computing implements a completely new approach towards the provision of computational resources (e.g. computation power, memory, …) that provides both advantages and challenges to IT Service Management. Basically some of the processes that have been very important in classical service provision (without the usage of cloud computing) become less important in cloud based scenarios. Vice-versa other processes become more important by making use of cloud services. This paper will discuss this question into further detail and will therefore usually take to different positions: on the one hand this paper takes the customers' points of view and on the other hand this paper also takes the cloud computing service providers' point of view.

In order for being able to clearly discuss the topic of this paper, first of all a short presentation about what the author understands under the term cloud computing gets presented. Usually cloud computing is separated in three different categories [4]:

- IaaS—Infrastructure as a Service: Virtual provision of computing power and/or memory. A prominent example of an IaaS service is the Amazon WS service;
- PaaS—Platform as a Service: Provision of a runtime environment, like application servers, databases, … In this area, Googles App Engine is probably the most prominent example;
- SaaS—Software as a Service: Provision of usually browser based applications that can directly be used. Here, Google Docs or the Customer Relationship Management software of salesforce.com might serve as examples.

Another categorization that is used within the area of cloud computing describes the question whether a publicly available cloud is used (public cloud computing) or a privately owned cloud, e.g. by one company, is used (private cloud computing). Also a mixture of these two types, so-called hybrid clouds, is possible. The question whether to use a public, a private or a hybrid cloud is especially interesting with respect to security issues. For example a company might be willing to put a certain service into the cloud, e.g. to gain more flexibility within the service provisioning, but might be concerned about security aspects if the data, the service operates on, is no longer into direct reach of the company, e.g. in its own datacentre.

1.2 The IT-Infrastructure Library: A Short Overview

The ITIL (IT Infrastructure Library) provides the de-facto standard for IT Service Management processes. It is currently available in version 3. According to the current version of ITIL a service runs through several lifecycle phases during his life, as shown in Fig. 1.

Within the Service Strategy lifecycle phase, strategic decisions towards a service are made, e.g. which service should be provided for which customer or what kind of new services a company will provide.

The second lifecycle phase, Service Design, is responsible for designing new services or to design changes in existing services to increase their quality.

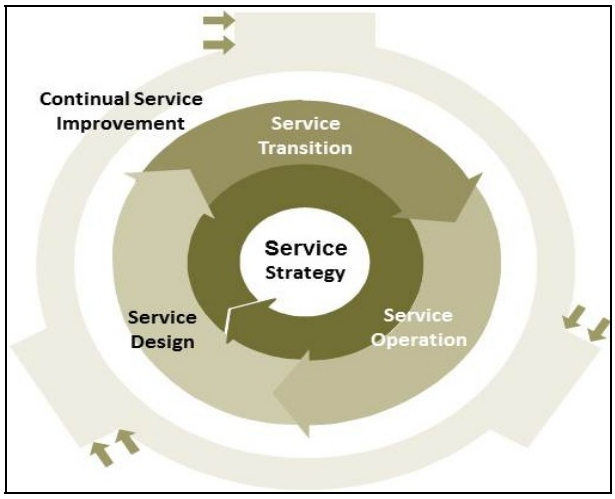

Fig. 1 The ITIL lifecycle approach. © Crown Copyright 2007 (OGC).

The necessary processes to transport services from the service design phase to operation are provided by the Service Transition phase, e.g. necessary processes to ensure that new or updated services are set into operation in a controlled way.

Within the Service Operation phase the services are running and produce an added value for the customers. This lifecycle phase provides e.g. processes like Incident Management or a process for the handling of Service Requests. Last but not least, there is a special Lifecycle phase for the continuous improvement of services that is responsible to increase the efficiency of the services provided.

Table **1** shows which lifecycle is primarily responsible for which processes.

As the name "library" already indicates, each of the five lifecycle phases is published in one book.

2. Discussion of the ITIL Lifecycle Phases with Respect to Cloud Computing Issues

The following provides a discussion about the certain ITIL lifecycle phases (and their corresponding processes) that have special aspects with regard to cloud computing. All processes that does not need to be considered especially in cloud computing environments, are not discussed.

2.1 Service Strategy

From a strategic point of view [5] within the Service Strategy Process it has to be identified what kind of services are candidates to be deployed in the cloud. Usually not all services can be run in the cloud, e.g. due to security restrictions. Especially if the service is a candidate to be deployed in a public cloud, the customer needs to accept that the data, on which the service operates, is no longer in direct reach of his own datacentre. That is usually no longer an issue for already outsourced services. Nevertheless, when it comes to business critical services one or the other customer might still think critical about this issue.

Furthermore the demand management process is a critical one for deploying a service in the cloud since this is the process that describes the performance needs of a certain service from a business perspective. In order to later on, in the design phase, allow the cloud provider to provide the necessary capacity for the service (within the capacity management process) the cloud provider needs to understand the capacity

Table 1 ITIL lifecycle phases and according processes.

Lifecycle Phase	Processes
Service Strategy	Service Strategy Process, Service Portfolio Management, Demand Management, Financial Management
Service Design	Service Level Management, Service Catalog Management, Availability Management, Information Security Management, Supplier Management, Capacity Management, IT Service Continuity Management
Service Transition	Change Management, Service Asset and Configuration Management, Release and Deployment Management, Knowledge Management, Transition Planning and Support, Service Validation and Testing, Evaluation
Service Operation	Incident Management, Problem Management, Event Management, Request Fullfillment, Access Management
Continual Service Improvement	seven Step Improvement Process, Service Reporting, Service Measuring

demands of the service from a business perspective.

This is the only way to allow the service provider to really fit the capacity needs of the customer.

Last but not least, the financial management process needs to provide the necessary data in order to decide whether a certain service can be deployed more efficiently in the cloud [6]. The Financial Management process also has to deal with a major problem of cloud based scenarios: the customer is usually very much interested in knowing the costs for a certain service before he runs the service. In a cloud based scenario where the cost is usually calculated at a per usage base, the cost for certain services can not be calculated a priori. This might be an advantage for one or the other service, but might as well be a problem for one or the other customer. Therefore, the Financial Management process needs to provide solutions for the a priori calculation (or at least an upper boundary of the costs) and the flexibility of the costs in a cloud based scenario.

2.2 Service Design

For the design of a new or changed service in a cloud computing scenario the Service Level Management process is extremely important [7]. Since a huge amount of the responsibility is transferred towards the cloud computing provider, the SLAs (service level agreements) need to reflect that. Therefore, especially the relevance of the UCs (underpinning contracts), that are in the responsibility of the Supplier Management process, need to be considered.

Another critical aspect is the availability and the capacity of a service that runs in a cloud computing scenario. Of course the availability of the service, as well as the performance of the service needs to be as described by the business demands with the Demand Management process. Therefore, depending on the choosen cloud computing scenario (IaaS, PaaS, SaaS) both, the availability and the capacity provided for the service need to be guaranteed. It is of high importance that the SLAs are negotiated at a reasonable level: in an IaaS scenario it does not make sense to negotiate an SLA with respect to response time of a certain service, but it would make sense to have a guaranteed amount of memory in the probably virtual environment. On the other hand if the service is provided by a SaaS scenario, the arrangement of an SLA based on the response time would make perfect sense. Here we find a close relationship between processes like the Service Level Management, the Availability and the Capacity Management in conjunction with the Supplier Management process.

Another important process, with respect to cloud computing, of the Service Design lifecycle is the Information Security Management process: As already said before, it needs to be accepted (at least in a public cloud scenario) that the data on which my service operates is no longer available in my direct reach, e.g. in my privately owned datacentre. Therefore it needs to be checked from a security perspective if it is possible to put the data for the services in question in a public datacentre. Again, this is not so critical for service that are already outsourced, but it may be critical for services that are newly created or updated. Furthermore other boundary conditions need to be concerned, e.g. within the European Community it is not allowed to store private data of individuals outside the European Union [8]. Additionally, a security concept within a cloud based environment needs to be set up completely different than in a usual environment [9]. Well-known security mechanisms like perimeter firewalls, demilitarized zones and intrusion detection systems do not work in cloud based environments. This is basically due to the high level of virtualization on which cloud based infrastructures are usually build. Moreover traditional aspects like the hardening and minimal installation of the operating system, user and rights management and user data encryption become more and more important within cloud based environments. For example a service provider that provides IaaS scenarios might want to provide extremely minimalistic machine images, on which only necessary

services are deployed, PaaS and SaaS providers might concentrate more on encryption of both user and communication data.

Additionally within the Supplier Management process the need for a deeper understanding of the related software licenses is necessary. Some software companies might prohibit the use of their software in virtualized environments, e.g. licenses for Oracle based databases are usually per CPU of the server that the database runs on. In virtualized environments this usually leads to the problem that a lot of CPUs need to be licensed since Oracle does not accept to limit the number of CPUs. Especially in cloud computing scenarios, that standard licensing model would lead to licensing every CPU that the database is potentially running on. Therefore software licenses based on a "per CPU" base do not scale very well in cloud computing scenarios. Moreover other companies do not directly prohibit the use of their software in the cloud, but limit the support opportunities for the software. One usual way to do this is to provide a service level that asks to provide the proof that a certain incident also occurs in the same way in a not virtualized environment. On the first view, this does not seem to be much of a problem, but having a closer look, it still provides some problems, at least if the service provider has to stick to a defined service levels or even high availability. Moreover the provision of additional hardware just to be sure to be able to proof that a certain incident also happens in a non-virtualized environment leads to an additional effort.

In the cloud, software licenses that are more related to the amount in which a certain software is used, scale a lot better, e.g. software licenses per user or (nowadays quite unusual) the amount of time a certain software is used.

One major advantage of moving a certain service into the cloud is that the IT Service Continuity Management process is no longer of high interest since the cloud computing provider guarantees a certain availability, also with respect to disaster recovery. But this leads to the fact, that the Service Level Management process becomes more and more important, since this is the process that is responsible to ensure the defined availability (in case of a disaster) as explained before.

2.3 Service Transition

Within the lifecycle phase Service Transition the results from the design phase are brought into production [10]. Therefore especially processes like the Change Management process and the Release and Deployment Management process are important for this phase.

One of the major goals of the Change Management process is to decrease the number of incidents due to changes and to provide mechanisms that allow to deploy changes in a controlled way. Within a cloud based environment the Change Management process needs to consider other services when deploying a change to one service. Since most of the commonly available IaaS scenarios are based on virtualization, potentially a large number of other services might be influenced by the work necessary to deploy a change to a single service.

On the other hand, the major goal of the Release and Deployment Management process is the protection of the productive environment. This process becomes even more complex since the complexity of a cloud based infrastructure is usually higher than the complexity of a non-cloud based infrastructure.

But also the service transition phase can benefit from deploying a service in the cloud: the usually very complex Service Asset and Configuration Management System becomes a lot easier. The major goal of the Service Asset and Configuration Management process is to provide an overview about all the parts (so called assets) of the infrastructure and the interrelations that are necessary to provide a certain service. This process is outsourced to the cloud service provider since he is responsible to run his infrastructure. Here, again the oursourcing level is highly dependent

on the cloud scenario (IaaS, PaaS or SaaS) in question. In an SaaS scenario the cloud service provider will be responsible for the complete Service Asset and Configuration Management process whereas in e.g. an IaaS scenario the cloud service provider will only be responsible for the infrastructure part of the Service Asset and Configuration Management process. The customer itself is in an IaaS scenario only responsible to provide the configuration management information about the used platform and the relationship between the used applications.

2.4 Service Operation

The service operation [11] lifecycle phase it the phase where the services are provided to the customers and where the added value for the customers is generated.

Processes like the incident, problem and event management do not run completely different in a cloud based environment in comparison to a not cloud based environment. Anyway, at least in a public cloud scenario some cloud based services are outsourced. Therefore, a high integration for the incident, problem and event management process of the cloud service provider and the corresponding processes at the customer site is necessary. Furthermore, the access management process becomes more important in cloud based scenarios. As already stated, usual security mechanisms like a perimeter firewall, demilitarized zones and intrusion detection do not work very well in cloud based environments. Therefore, the only way to protect the data is to provide a reasonable concept for the access rights of the data and the resources provided in the cloud.

Additionally, the Request Fullfillment process, that is responsible for the fulfilment of small user requests, e.g. resetting a password, becomes more powerful from a user perspective. Usually standardized changes can often be applied over the Request Fullfillment process. Within ITIL a standardized change is defined by low costs, low risk and the change has to be run successfully at least once before. If all these criteria are met, a certain change can be made a so-called standard change and these kind of changes can usually later on be applied over the Request Fullfillment process. In a cloud based scenario all these criteria are met also for increasing a certain resource, like computing power or amount of memory. Changes at this level are now able to be deployed over the Request Fullfillment process which is completely not possible in a not cloud based scenario. This is basically one of the reasons for the increased flexibility of cloud computing scenarios. Therefore, it could be said that to this extend the Request Fullfillment process becomes more powerful in cloud based scenarios.

2.5 Continual Service Improvement

The Continual Service Improvement phase is responsible to ensure that the provided services are provided more efficiently over time [12]. This is the major goal of the seven step improvement process. With respect to cloud based scenarios the quality improvement might be to put as many service as reasonably possible in a cloud based scenario to increase the flexibility of the service and, at the same time, to decrease the cost of the services in question. This would lead to a completely new dimension for the seven step improvement process. Usually this process concentrates on the internal improvement of the process. Internal improvement here means, that the service itself is the goal for the improvement, for example lowering the response time in the Incident Management process. In a cloud computing scenario, a new dimension for the service improvement might be to bring new services in the cloud. This is a difference in comparison to the improvement of the service itself: by just moving a service into the cloud, the service itself is not improved, but the runtime environment and the necessary infrastructure gets improved. Therefore, this process should concentrate on the delegation of good experiences in the cloud to other services. Additionally, to allow for the measurement of service

quality, the Service Measuring process is also in the responsibility of the Continual Service Improvement lifecycle phase. This process becomes more and more important in cloud based scenarios, since it is responsible to provide key performance indicators that can on the one hand be used in the Service Reporting process and on the other hand in the seven step improvement process to determine possible potential of services and especially cloud based services.

Last but not least, the Service Reporting process is responsible for the reporting of service quality and to provide the data that allows to proof that a certain service level has been reached in the past or not. As already said, the negotiation of service SLAs (level agreements) is extremely important helpful in cloud based scenarios and therefore a mechanism that allows to control these Service Level Agreements becomes more and more necessary as well. Here, cloud computing scenarios usually provide tools that allow to automatically provide certain values that are necessary for the monitoring of the according Service Level Agreements, e.g. the availability of a virtualized machine that is in charge of providing a certain service.

3. Overview of Changing Complexity and Importance of Certain ITIL Lifecyle Phases and According Processes

The last paragraph presented a discussion about the different ITIL processes and their importance with respect to cloud computing and/or in a cloud computing scenario. As also described before, each single process results from a certain lifecycle phase. This paragraph now tries to develop the importance of certain lifecycle phases either from a customers' (who's willing to deploy a service in a cloud computing scenario) and a cloud computing service providers' point of view. It is important to bear in mind that within this discussion, the focus is always on a service that gets provided for a customer. Therefore, e.g. within the Continual Service Improvement lifecycle (if not mentioned differently) the service itself is focused. Of course the cloud computing service provider also needs to improve the necessary cloud computing services, but this is not the focus of this paper.

First of all, we start with the customers' point of view. The importance and/or complexity of each single lifecylcle phase in a cloud computing scenario (in comparison to a not cloud based environment) is shown in Fig. 2.

Still, of course, from the customers' point of view the Service Strategy lifecycle phase is of high importance. Within this phase, the company has to decide which services it will provide to which customers. On the first view, this has nothing particular to do with the question whether the service will later-on be deployed in a cloud computing scenario or in a usual infrastructure. Having a closer look at the single processes of this lifecycle phase, as discussed in the former paragraph, it becomes obvious that processes like the Financial Management process and the Demand Management process become more and more complex and get another importance.

Within the Service Design lifecycle phase, the particular service gets designed. Here especially services like Service Level Management, Availability Management, Information Security Management, Supplier Management, Capacity Management and IT Service Continuity Management become a little bit more complex in a cloud based environments in

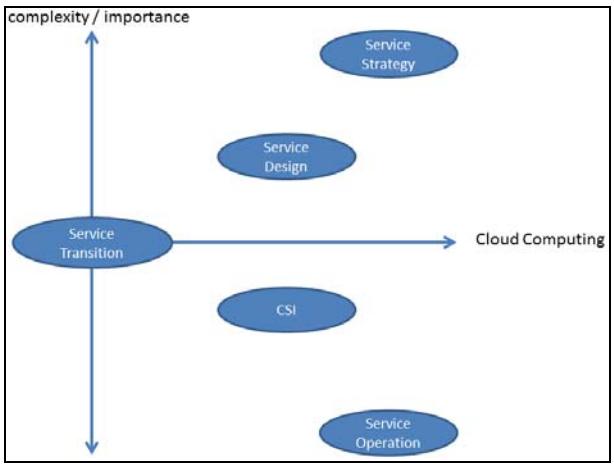

Fig. 2 The importance/complexity of the ITIL lifecycle phase from a cloud computing customers' point of view.

comparison to a usual environment.

As for the Service Transition lifecycle phase, there is not much of a difference with respect to complexity and importance, if you compare a cloud based scenario with a usual environment.

The real benefit for the customer of a cloud computing provider is within the Service Operation lifecycle phase. Also the certain processes that belong to the Service Operation lifecycle phase might slightly change or get an increased importance and/or complexity, but still the benefit for the customer definitely lies within the Service Operation lifecycle phase, since he is no longer responsible for the production of the service (from an infrastructural point of view) and, at the same time, the customer is very flexible with respect to the amount of infrastructure he has to pay for.

The discussion of the Continual Service Improvement lifecycle phase is a little bit more crucial: of course the complexity and/or importance of this lifecycle phase is still the same when it comes to the internal improvement of the service itself, there is almost no change in comparison of a cloud based to a usual infrastructure. Nevertheless, there is another dimension of possible service improvement that yields to the question whether other service might also be deployable in cloud based environments. Here, from a customers' point of view, this might not be so much of interest.

So from a customer of a cloud computing providers' point of view, the first two lifecycle phases get a lot more complex and gain a higher importance, whereas especially the Service Operation process becomes much less important and even less complex. Usually that is exactly what is of interest for the customer, since the Service Strategy and Service Design lifecycle phases are much more concentrated towards the core business of the company and the later lifecycle phase are simply necessary, but do usually (as long as the company is not an IT company ifself) not belong to the core business of the company. Therefore, reducing the complexity and importance of these lifecycle phase does perfectly make sense from a customers' point of view.

Fig. 3 now answers almost the same question about the increasing complexity and/or importance of the certain ITIL lifecycle phases for cloud computing based infrastructure, but this time from a cloud computing service providers' point of view.

Basically, from the providers' point of view it is just the other way round. Of course the most important lifecycle phase for the cloud computing Service provider is the Service Operation lifecycle, since he is responsible for the operation of the service and (at least partially) the generation of the added-value for the customers of his customer.

Of course from the service providers' point of view, also the Continual Service Improvement lifecycle phase becomes more and more important. If the provider manages to continuously improve his services, he might probably convince more and more customers to deploy their services in a cloud computing based scenario, or he might convince his current customers to deploy more services in his cloud based environment.

With respect to the Service Transition lifecycle phase, as already said in the description from the customers' point of view, there are usually almost no changes in complexity and/or importance to suspect.

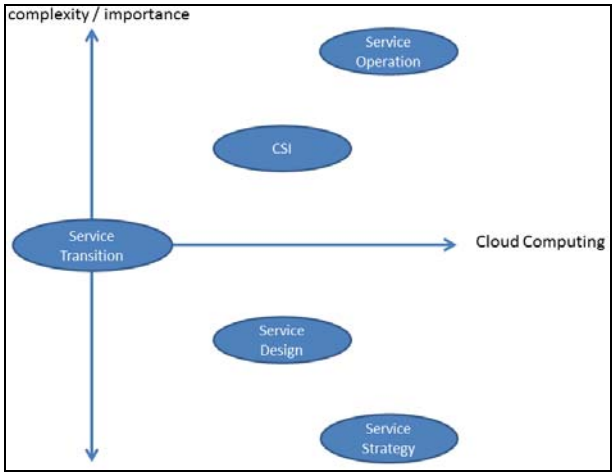

Fig. 3 The importance/complexity of the ITIL lifecycle phase from a cloud computing service providers' point of view.

The Service Design lifecycle phase is from a service providers' point of view much less important in comparison to the customers' point of view. The responsibility for the design of the service in question is with the customer of the provider. Of course the service provider has to provide input for the cloud computing specialities, but still the customer is in charge of the design of a certain service.

Also with respect to the Service Strategy lifecycle phase, the service provider is not in charge of this lifecycle phase. The strategic decisions about the service in question still needs to be performed by the customer itself. Here, again, the cloud service provider might provide internal information about the cloud computing infrastructure, but these informations are just provided as input and the customer has to take the strategic decisions on the basis of this information. Therefore, from the service providers' point of view, the importance and/or complexity of the Service Strategy lifecycle phase is pretty low.

In Fig. 4 the two different points of view, the one from the customer and the one of the service provider, are aggregated. The symmetry along the aches of the customer and the service provider shows that on the one hand ITIL is able to provide a solution for the management of cloud based environments, at least when the discussion that this paper provides for the certain processes are taken into account. Furthermore, the symmetry of the aches of complexity/importance shows that an almost natural division of labor consists between the customer and the cloud computing service provider.

This two observations together provide (from the authors' point of view) the proof the ITIL would not only be able, but be the right framework, also for cloud computing based infrastructures.

4. CSF (Critical Success Factors) for ITIL as the IT-Service Management Framework for Cloud Computing Based Infrastructures

In IT-service management CSF (critical success factors) provide necessities that need to be provided/fulfilled in order for a certain aspect to work.

This paragraph will now provide the CSFs' that are necessary in order for making the IT Infrastructure Library ready for managing cloud computing based infrastructures.

On the one hand the results of the second paragraph, where this paper presented the discussion of the different ITIL processes, need to be considered before ITIL is used for the management of cloud computing based infrastructures.

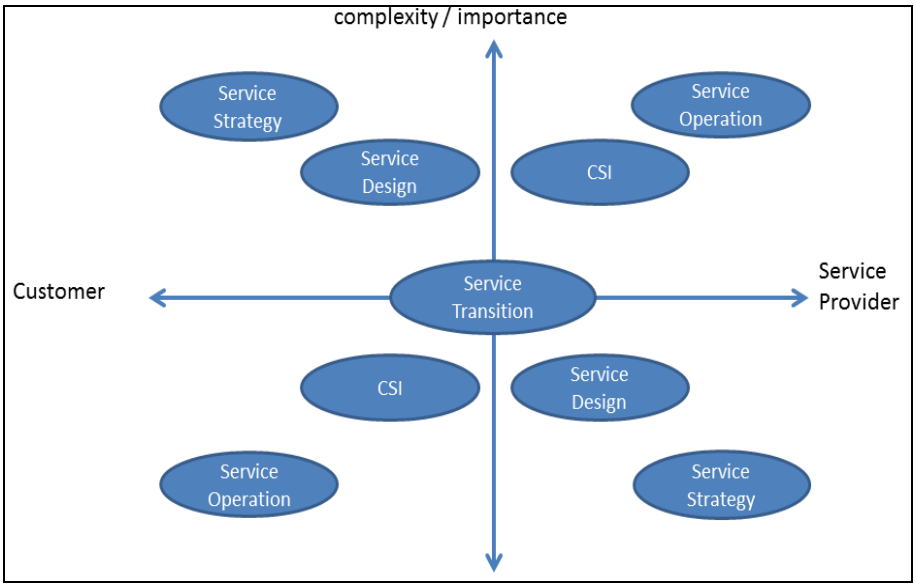

Fig. 4 The importance/complexity of the ITIL lifecycle phase aggregated for the service provider and the customer.

One of the most important CSFs', from the authors' perspective, is the permanent and continuous negotiation of Service Level Agreements within the Service Level Management process. This is basically the only way for the customer and the provider for the negotiation of the certain responsibilities and interfaces.

Furthermore, the usage of ITIL in cloud computing scenarios implies naturally a division of labor between the service provider and the customer. This division of labor can clearly be communicated via the different lifecycle phases, as described in this paper. Therefore, another CSF is for both parties, the service provider and the customer, to respect the given division of labor.

The major interface between the customer and the service provider is within the Service Transition lifecycle phase. The basic ideas of processes like e.g. the Release and Deployment Management process is the protection of the productive environment. Within the formerly mentioned division of labor between the service provider and the customer, the customer needs to provide the developed service within the Service Transition lifecycle phase to the service provider. The service provider has to take over the service and to bring it in production in a controlled, standardized and reliable way. It is crucial for the usage of ITIL [13] in cloud computing scenarios that the Service Transition phase is respected as the interface between the service provider and the customer by both parties. Otherwise the formerly described division of labor will not work properly.

Additionally, one of the processes which importance and complexity increases the most, is the Request Fullfillment process. As already described, standard changes (low risk, low cost, at least once performed successfully before) can be requested via the Request Fullfillment process. This is on the one hand extremely important to be aware of since a formerly not so important process becomes a much more powerful process. On the other hand the increasing importance of the Request Fullfillment process is crucial for the success of a cloud based services since the increased flexibility (with respect to the provision of computational resources) is one of the major advantages of the whole cloud computing paradigm.

5. Conclusions

The discussion shows that ITIL, as the de-facto standard for modern IT Service Management, can also be applied for the IT Service Management of cloud computing environments. Yet, most of the processes need to be considered differently in comparison to a usual, not cloud based, infrastructure.

From a customer point of view, the lifecycle phases for the strategic decisions and the design of certain services will be more complex if the service should later-on be deployed in a cloud based environment. Thus, the later lifecycle phases like the transition and the operation phase, are more likely to be easier to handle, at least if a public cloud of an external service provider is used. This is mainly due to the fact that the responsibility for these lifecycle phases is in this scenario outsourced to the service provider in question. Within the phase of continual service improvement, both, the customer and the service provider, need to work hand in hand to improve the quality of the service.

From a service providers point of view, the first two lifecycle phases are not of high importance. A service provider here only has to provide interesting attractions in order to motivate a customer to put at least some of his services into the cloud. The other way round, the lifecycle phases of the transition and operation of services are more important from a service provider point of view, since these are the phases where he produces the added value for his customers.

Moreover, the discussion shows that ITIL in his current version has not yet set up specialized services with respect to cloud computing. This might probably be the case for the upcoming version of ITIL, but since cloud computing is already quite interesting for a large number of customers, and the number of service

providers in the area of cloud computing is constantly growing, there is actually already today a need for IT Service Management in the cloud. ITIL provides a good basis for this, but needs to be considered differently at least in some processes.

Acknowledgments

This work was partly supported by an Amazon AWS research grant.

References

[1] P. Mell, T. Grance, The NIST Definition of cloud computing. Version 15, 2009.

[2] S. Pastore, Distributed computing platforms like clouds and web standards: what could be the solution in an open environment, in: Proceedings of the WSEAS International Conference on Recent Researches in Applied Computer and Applied Computational Science, Venice, 2011.

[3] C. Zhao, H. Gan, G. Fei, A study on the process model for IT service management, in: Proceedings of the 3rd WSEAS International Conference on Computer Engineering and Applications, 2009.

[4] D. Chappell, A Short Introduction to Cloud Platforms: An Enterprise Oriented View, San Francisco, 2008.

[5] M. Igbal, M. Nieves, Service Strategy: Office of Government Commerce (ITIL), The Stationary Office Ltd, 2007.

[6] G. Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly, 2009.

[7] C. Rudd, Service Design: Office of government commerce (ITIL), The Stationary Office Ltd, 2007.

[8] European Community Directive 95/46/EC, Official Journal L 281, 1995.

[9] P. Kragelj, For small and medium enterprises (SME) deliberating cloud computing: a proposed approach, in: Proceedings of the WSEAS International European Computing Conference, 2011.

[10] S .Lacy, Service Transition (ITIL), The Stationary Office Ltd, 2007.

[11] D. Cannon, Service Operation: Office of Government Commerce (ITIL), The Stationary Office Ltd, 2007.

[12] G. Spalding, Continual Service Improvement: Office of Government Commerce (ITIL), The Stationary Office Ltd, 2007.

[13] D. Donko, I. Traljic, IT service management and normatively regulated activities, in: Proceedings of the 5th WSEAS International Conference on Telecommunications and Informatics, Istambul, Turkey, 2006.