

End-to-End IT Service Management for automated Computer Centers in heterogeneous IT Landscapes

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Abstract: Cloud computing changes the way of delivering and consuming IT services. Due to increasing modularization and standardization, it is possible to deliver high scalable and flexible IT cloud-based services at an advantageous price. Therefore cloud computing supports the process of IT industrialization to a high extent. On the other hand the industrialization of IT involves the trend towards cloud-based value chains respectively value networks. Most of the IT service providers have to handle heterogeneous IT landscapes and their value networks including all upstream suppliers. Therefore a high degree of automation of computer center and especially service processes is necessary. However, the IT service providers cannot influence the upstream value networks, while they are fully responsible for the service delivery towards customers. Therefore, the current state of end-to-end IT Service Management (ITSM) for automated computer centers in heterogeneous IT landscapes will be analyzed to develop requirements for an ITSM value network solution. In order to achieve these objectives a threefold-approach will be used. Firstly, a literature review will be conducted to review existing ITSM solutions and to identify known problems. Secondly, explorative case studies will be conducted with experts from the field of ITSM and cloud computing to ensure a proper understanding, to gain deep insights and to develop requirements for an end-to-end ITSM framework. Finally the common ITSM standards will be reviewed and revised in order to develop standards. Accordingly, this thesis contributes to theory by developing the framework and enriching common ITSM standards on the basis of the value system theory. Practitioners benefit from being able to manage their heterogeneous IT landscapes and to modernize their ITSM by using those new standards.

Motivation and Purpose

Cloud computing sustainably changes the way of generating, delivering and consuming IT services (Böhm et al. 2010a; Hoberg et al. 2012; [Heininger et al. 2012](#)). More specifically, cloud computing allows to establish a new provisioning model for IT and IT services ([Böhm et al. 2009](#); [Heininger 2012](#)). Furthermore, rapidly changing, complex and competitive business environments call for highly scalable and flexible IT services. Against the background of the increasing demand for cloud services along with the

increasing level of industrialization, the IT industry faces the change from the common one-to-one-service-model towards complex value networks. One consequence of this is a distributed service generation. However, customers will not accept to interact with several providers for obtaining one service. Also, referring to §§ 3 VII & 11 I of the German Federal Data Protection Act (BDSG, version dated January 14, 2003), the provider is obliged to ensure data protection and data security by himself.

Cloud computing is a new delivery model for IT services (Böhm et al. 2009), that enables modularization, standardization and concentration on core competencies in the IT industry (Böhm et al. 2010a; Heininger et al. 2012; Lindner et al. 2011). Analogies in the further development of IT industrialization supported by cloud computing can be found in comparison with the automotive industry (Böhm et al. 2010a). For example, the outsourcing of complete modules towards upstream suppliers in automotive supply chains, its diverse network and the issue of transparency in supply chains can nowadays be found in cloud computing value networks (Böhm et al. 2010a).

A literature review shows that there is only little work done on the impact of cloud computing and complex value-creation networks on the proven ITSM standards (e.g. ITIL) (Heininger 2012). Despite that, ITSM is acknowledged as an important element to handle responsibility and complexity in cloud computing value networks (Liu et al. 2011; Hamm/Yampolskiy 2008).

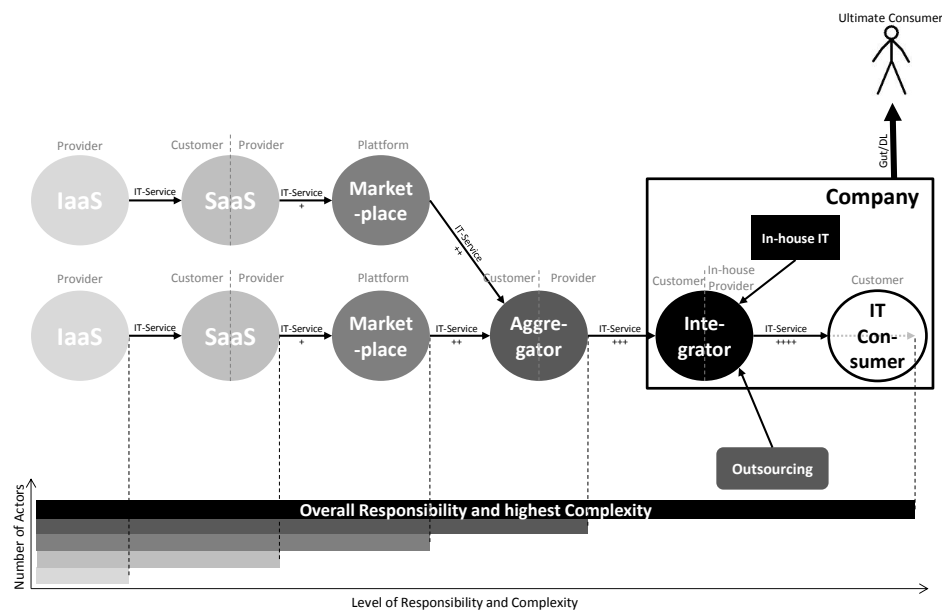


Figure 1: Complexity of a heterogeneous IT landscape in a schematic view (own illustration)

Figure 1 shows a schematic view of supplier-customer relationships in a cloud computing value network including their increasing responsibilities, representing the rising complexity of a heterogeneous IT landscape. The in-house IT service provider

(ISP) or integrator according to [Böhm et al. \(2010b\)](#) for example is responsible for IT services across the whole IT value network including the final service delivery to the ultimate consumer ([Böhm et al. 2010a](#)). Furthermore, some ISPs have to combine cloud services with other forms of outsourcing and traditional in-house IT service providing, which we call a heterogeneous IT landscape ([Knittl/Lauchner 2010](#)). Before the era of cloud computing, the ISP has been responsible for in-house service delivery and with regard to outsourcing as principal. In IT value networks, the ISP becomes additionally a customer due to outsourced services. However, the responsibility for the complete service delivery must be guaranteed by the IT service provider, especially performance, availability and security levels for the promised services. Moreover, the aspect of automated computer centers which require automated service processes worsen the situation and represent a challenge for ISPs. At present ITIL or eTOM (enhanced Telecom Operation Map) could not applied for the management of distributed service generation ([Hamm/Yampolskiy 2008](#)). Therefore, this thesis aims to develop new or complementary recommendations and enrich existing ITSM standards for end-to-end ITSM in cloud computing value networks. Finally, the requirements shall be generalized and transferred to IT by integrating them into the proven ITSM standards, for example ITIL based on the value system theory by Porter (1991).

Research Questions and Approach

The research design follows the design science research approach ([Hevner et al. 2004](#)). Therefore, the research questions support the identification of the problem relevance (RQ 1), enable the development of a model for cloud computing value networks (RQ 2) and contribute to theory by developing recommendations for ITSM on the basis of the value system theory (RQ 3). Hence, the thesis is guided by the following three research questions:

RQ1: What is the current state of end-to-end ITSM for automated computer centers in heterogeneous IT landscapes?

To answer RQ 1, I will do a literature review ([Webster/Watson 2002](#)) to identify the current state of end-to-end ITSM for automated computer centers in heterogeneous IT landscapes. The findings will be analyzed and structured to identify research gaps and current problem areas. The result will be an overview of known challenges and issues. Also a research map showing actual results of research and existing research gaps respectively problems will be developed.

RQ2: What are prerequisites for guaranteeing quality distributed services for end-to-end ITSM?

In order to answer RQ 2, this thesis will conduct explorative case studies ([Yin 2009](#); [Gläser/Laudel 2010](#)) to describe requirements for ITSM in the light of distributed service creation. The case studies include several actors according to the generic value network

of cloud computing ([Böhm et al. 2010b](#)). Based on the analysis I will develop a catalog of requirements.

RQ3: What would be a suitable concept for automated computer centers in heterogeneous IT landscapes in an end-to-end ITSM?

Drawing from the results of RQ 2, the common ITSM standards will be reviewed and enriched. Various studies show that ITIL is accepted as standard in service oriented IT management, especially in Europe (Buhl 2008, 35-60). Therefore enriching the ITIL standard based on the value system theory by [Porter \(1991\)](#), implies to contribute to theory and practice by improving processes for managing, governing and supporting cloud computing value networks. By combining the results of RQ1 and the requirements found in RQ2, RQ 3 aims to close the gap between the actual ITIL documentation and the requirements of cloud computing value networks. Therefore, methods and recommendations shall be derived and an enriched model for ITIL to address end-to-end ITSM for automated computer centers in heterogeneous IT landscapes will be developed.

Implications

The results of this thesis will enable IT organizations to manage, govern, plan and develop heterogeneous IT landscapes, especially cloud computing value networks using ITSM standards like ITIL. This allows practitioners to optimize their IT service processes and compensate negative effects of cloud computing value networks. Therefore the common ITSM standards will be reviewed and enriched. Furthermore, additional recommendations for ITIL considering cloud computing effects will be developed. The results of this dissertation could provide a basis for a new release of ITIL, eTOM or other ITSM standards.

Originality

The impact of cloud computing on end-to-end ITSM in the specific context of heterogeneous IT landscapes has not until now been examined. However, it is obvious that cloud computing will accelerate modularization, standardization and concentration on core competences in the IT industry and will thus increase the number of actors in the IT value creation network and further the allocation of service delivery. But until now, the ITSM standards are not examined in these premises. Also there is no idea how to share efforts and benefits equally among suppliers and customers in an IT service delivery cloud computing value network. Especially the role of common ITSM standards and their ability to support this approach has not been researched until now.

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