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Conference Paper

Collaborative product development: The case of network operators

23rd European Regional Conference of the International Telecommunications Society (ITS), Vienna, Austria, 1st-4th July, 2012

Provided in Cooperation with:
International Telecommunications Society (ITS)

ITS Vienna 2012 Academic Conference Paper:

Collaborative Product Development –

The Case of Network Operators

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Keywords: Integrated Service Provider, Network Operator, Cloud Services, Product Development, Cloud Value Chain.

Abstract

The goal of this paper is to evaluate the importance of cloud services for Integrated Service Providers and how collaborative product development could strengthen their position within the "Cloud Industry".

The global cloud market is growing rapidly and gaining daily more momentum. The German Bitkom estimates B2B cloud revenues to exceed 10 bn Euro in Germany by 2016, five times its revenue in 2011. Telecommunication Services – home market to Integrated Service Providers (ISPs) - on the contrary are mostly past their booming years. Even so ISPs are playing a crucial part in the cloud – basically connecting production and consumption – they are typically not mentioned amongst the main Cloud providers. This is puzzling as an integrated network is able to deliver significant unique value in areas such as SLA management, locality, security and inter-cloud connectivity.

To understand this seeming contradiction it is crucial to highlight how the "Cloud Value Chain" differentiates from the traditional home market of Telecommunication Carriers. Time to market is becoming more and more critical as pure Service Provider (SPs) such as Amazon and Google are entering the market. More and more connectivity – the key competency of ISPs - is seen as commodity and can be treated as given by pure SPs. The authors argue that this weak position of ISPs within the cloud market can be largely explained by too slow product development.

The research questions dealt with are: (1) Importance of Cloud Services for ISPs (2) Underlying factors for current performance with Cloud Services (3) Potential contribution of collaborative product development for gaining momentum in the Cloud business.

To evaluate what strategies ISPs pursue to gain a stronger footprint in this growing business opportunity we interlink Williamson's transaction cost theory and Porter's value chain into an interaction framework. Using several expert interviews and extensive secondary research the authors map actual interaction of ISPs with their ecosystem against the theoretical framework.

Results show clearly that ISPs should tackle different cluster of products with different types of product development. We introduce a two- step framework recommending different types of product development based on the addressable market, core capabilities, technical integration and estimated time to market. Further research for validating the proposed framework is highly recommended.

1 Introduction

Cloud is definitely amongst the most hyped ICT- trends of the last years. The German Bitkom[1] estimates B2B cloud revenues to exceed 10 bn Euro in Germany by 2016, five times its revenue in 2011 (Bitkom. 2011).

The term Cloud is hard to grasp and defining it is – at least – challenging. There are, however, several key components that are commonly accepted as a necessity for a Cloud Service: Central intelligence, connectivity and endpoints for consumption (NIST, 2009). The market for endpoints and central intelligence is very diverse. Connectivity, however, is dominated by few Integrated Service Providers (ISPs), as the barrier of entry (Porter, 1996) is very high mainly due to governmental licenses and required investment in the infrastructure.

The Telecommunications market – home of the Integrated Service Providers – has gone through significant transformation within the last decade and is fast approaching market saturation in developed countries. Demand is – simply put – limited by the number of endpoints in use and the amount of data they consume. According to Li (2002) it is becoming increasingly difficult to earn money with data and voice services – the “home” market of ISPs. Together with the collapse of some classical “cash cows” – international roaming and SMS - this puts significant pressure on ISPs to move into new markets (Telco 2.0 Research, 2009).

Cloud offers impressive business potential and a strong proximity to ISPs current business. For these reasons the authors argue that ISPs should consider the launch of Cloud services amongst their top priorities. This assumption is our first research question.

Integrated Service Providers are able to generate significant value- added in Cloud Services. Some of the main benefits are the possibility to offer location based services, end- to- end Service Level Agreements (SLAs) and interconnection between different Cloud Services. Additionally, accorindg to Hagel (1999) ISPs have a strong installed base with direct customer contact, including an existing billing relation, which strongly facilitates upselling of new services. All these competences put ISPs into a strong position to complement their connectivity offering with Cloud services.

As expected ISP launched several Cloud services and offered a myriad of different services (van Kranenburg, & Hagedoorn, 2008; Picot, 2008). Unfortunately, these services never captured the expected market share and overall failed to deliver the expected business impact. Mainly the late market entrance led to the failure of the Cloud Service – until now there is no real success story of a Cloud Service developed by an ISP (Yelmo, del Álamo, Trapero, & Martín, 2011). This view is consistent with recent reports, identifying no IPSs as 1- Tier Cloud Provider (Bums, 2011; Leong, & Chamberlin, 2011) – the few exceptions are acquisitions.

This contradiction between a strong market position and several unique selling points on the one hand and a lack of success of ISPs in the Cloud Industry on the other hand shall be our second research question.

[1] Bitkom represents the German ICT market with over 1.700 associated enterprises. http://www.bitkom.org

Pure Service Provider in their vast majority treat connectivity as a given and can hence focus only on optimizing their own Cloud Offering, at best treating the underlying “bitpipe” as an afterthought (Li, 2002; Picot, 2006). Also the development of new Cloud Services requires rather modest resources for leading subsequently to a lean governance and development process at SPs.

Integrated Service Provider, on the other hand, are used to very time and money intense product development which leads to a very thorough process of allocating the needed resources and a very time consuming development process. In the “old” Telecommunication industry this was common practice and seemingly the best way of doing business. However, in the “new” Cloud Industry time to market is absolutely critical to capture business potential. This comparative disadvantage of ISPs is further confirmed by recent complex systems simulations, which suggests that ISPs are over engineering their service offering and, as a result, lagging behind more agile pure SPs in this very time sensitive industry (Grove & Baumann, 2011).

How can Integrated Service Providers react to this challenge and speed- up their product development for Cloud services? This is the third research question we want to discuss in this paper with a special focus on the thus far unexplored area of collaborative product development.

Williamson (1981) showed that the boundary of a company is determined by the costs of transaction. Product development of ISPs always includes spanning a joint development process over several companies allowing three types of interactions – Make, Buy and Ally (Espino-Rodríguez, & Padrón-Robaina, 2006). By mapping these types of interaction against the eco-system (adapted from Porter, 1985; Velten & Janata, 2011) of the ISPs we create a framework which shows all mutually exhaustive possibilities of interaction within the Cloud Industry from an ISPs point of view. This theoretical framework is the basis for several semi- structured interviews with industry experts and extensive in- depth literature research.

Our results suggest that ISPs should consider refining the product development process on the basis of the following criteria: Market size and proximity to core business. Only products fulfilling both requirements should pass to the product development department. Such qualified products should than be further refine. It is important to note that all products within the product development are per definition high value, as low value products have been dismissed in the first step. In this second step the proposed dimensions are time sensitivity and integration into connectivity. Arguing that there is no “one size fits all approach”, the authors suggest a specific course of action for each of possible scenario. In particular Re- Selling and external product development are the most relevant approaches for Cloud Services as time sensitivity can be assumed to be high.

Re- selling basically means that the ISP merely acts as the Go- To- Market channel for certain products. Typically, these products are provided by mayor Technology Vendors or pure SPs and no direct value can be added through product development other than bundling with existing services from the ISP.

External product development suggests utilizing a small entity outside the ISP as an incubator to create a Cloud Service, providing the needed time to market momentum. In this case product development acts as a portfolio manager and facilitates the technical integration of the new service.

Our paper is structured as follows. The following section describes the conceptual background. Here we will define key concepts like Cloud, ISPs compared to pure SPs and the ecosystem they act within. We also describe the theoretical framework. Our particular focus is on validating the interaction framework for product development with our expert interviews to gain insights about ISPs actual behavior. In the third chapter we discuss our findings and develop a blueprint how ISPs should ideally proceed in the product development. The implications of this framework, its validation and suggestions for further research will be discussed on the last section of this paper.

2 Conceptual Background

2.1 Cloud – Basic definitions

Evaluating the importance of Cloud Services is the starting point of every interview we are conducting. Hence, it is critical for us to have a clear and consistent definition of the term Cloud and the companies participating in the Cloud industry. For our purpose, we shall define Cloud Services as "the delivery of computing and storage capacity as a service to a heterogeneous community of end-recipients" (Wikipedia, 2012). Even so this definition is still evolving (NIST, 2009) it is valid to focus on the three main characteristics of any cloud service: Central intelligence, where cloud services are actually generated, the endpoints granting access to these services and the connectivity bringing the service to the user.
Additionally, the National Institute of Standards and Technology (2009) defines the deployment and service models. The actual service provided can be structured as follows: Infrastructure (IaaS), Platform (PaaS) or Software (SaaS)) as a Service. Each service is based on the layers beneath, however, can be delivered independently. Prominent examples for each service are Amazon R3 (IaaS), Apple's App developer kit (PaaS) and Salesforce.com (SaaS). For the purposes of this research paper we shall not differentiate between the three Cloud service types, as all require connectivity alike. A last way of segmenting Cloud services is by deployment model: private, public and hybrid clouds (NIST, 2009). The difference lays here within the users having access to the provided service, independently of the service model Iaas, PaaS or SaaS. Whereas public Cloud Services can be accessed by anybody connected to the www (i.e. Dropbox) private Cloud Services can only be accessed by a closed user group (i.e. Company Intranet). Hybrid Clouds combine both worlds and are typically used to add scalability to private clouds. Due to the nature of Integrated Service Providers we focus on public cloud offerings.
In its 2012 Cloud Vendor Benchmark Experton includes the following parties in the cloud ecosystem which we will adapt slightly: (A) Cloud Integrator. We shall keep the term somewhat broader, System Integrator, which basically build and service working solutions out of several hardware and software products (B) Cloud Service Provider. In this paper we will be using the term "pure" Service Providers (SP), as these enterprises do not own a network and operate purely on 3rd party connectivity (C) Integrated Service Provider. Owning the connectivity infrastructure, all voice and data traffic will go at one point or another through the ISP's network. (D)

Technology Vendor. Delivering the software / hardware the services are built upon. The Cloud eco- system and the interaction with the system are shown in **figure 1**:

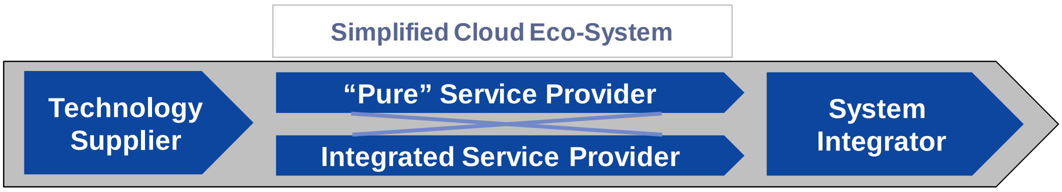

Fig. 1 Simplified Cloud Eco- System

For the authors it is surprising to see that ISPs are only playing a minor role within the Cloud industry. Based on two studies with a total of 27 evaluated companies only two carriers are considered to play a significant role in the Cloud Industry (Bums, 2011; Leong, & Chamberlin, 2011). This strong discrepancy between the strong market position of ISPs in the connectivity space – a central area of the Cloud Industry – and the perception of and within the industry is one of the riddles this paper aims to solve.

2.2 Why ISPs did not arrive in the Cloud (yet)

Several Service Providers are successfully attacking ISPs (Telco 2.0, 2009) in their home market and regulators are limiting former cash- cows like roaming (Teletarif, 2009) which inevitable puts significant pressure on ISPs to launch new blockbuster products. So far, however, ISPs failed to do so (Yelmo, del Álamo, Trapero, & Martín, 2011).

There is a wide variety of definitions for Integrated Service Provider in the general literature; however, the common denominator is that ISPs provide telecommunication services to their clients by owing the mobile, the fixed network or both. As the investment in the required infrastructure requires a significant investment, German UMTS Licenses cost around 50 bn Euro in 2000 (Vohra, & de Vries, 2001), economies of scale are essential for the willingness of an ISP to invest (Chuang, 2001). As a result product development was very time intense, resource depended and generally not too time critical. This product development process, however, is the very source of ISPs launching Cloud Services to late.

This view has been recently hardened by a complex system simulation (Grove, & Baumann, 2011). In a nutshell, the pure SPs take the connectivity as a given which results in a faster time to market. Integrated SPs on the opposite tend to optimize both, the offered Cloud Service and the underlying connectivity. "Because learning about both domains and their interdependence requires more time, performance in the short run will be lower than that of pure service providers that can focus on adapting their service-related activities to a given infrastructure that is beyond their control" (Grove, & Baumann, 2011).

[2] Five are Integrated Service Providers (AT&T, Tata Communications, Verizon, NaviSite and Savvis). However, only AT&T and Tata actually build in- house their own Cloud Service, whereas the remaining three ISP simply acquired Cloud Provider in the recent past. (Verizon bought Terremark, Warner Cable bought NaviSite and CenturyLink bought Savvis – all acquisition closed in 2011).

2.3 Theoretical Framework

According to the transaction cost theory any enterprise has two options for organizing its activities: an internal hierarchical structure that integrates the activities into its managerial structure, or a market relationship with external firms. That is, the company decides either to 'make' or 'buy' the components and services required. The boundary of the firm is defined by the equilibrium between the advantage of lower transaction costs of internal production and the lower agency costs and economies of scale of outside procurement. (Williamson, 1985; Clemons et al, 1992).

Putting it differently, "the value added chain, which is a metaphor for all the steps that have to be taken in the production of a good or a service, is not necessarily integrated in one organization. For each task an organization has to perform - be it research and development of new products, customer services or cleaning the workplace - it can decide to take care of this task internally, to outsource it or to enter into an alliance with a partner extern to the organization" (Geyskens, & Kumar, 2006). As Bruce et al (2007) put it "it is apparent that more and more organizations are embarking on collaborative ventures to develop products. This is particularly evident in Information and Communication Technology (ICT) sectors, so much so that part of the 'received wisdom' of ICT companies is that collaboration is the preferred route for product development."

Espino-Rodríguez et al (2006) concluded that ISPs can interact within their eco- system by buying, making or allying. This leads us to the following 4x3 matrix in **Figure 2:**

	Technology Vendor	"Pure" SP	Network Operator	System Integrator
Sourcing from				
Re-Selling				
Co-Branding				
Joint Develop.				

Figure 2: ISP interaction possibilities within its eco system

We adapted the available types of interaction slightly, so that all interaction possibilities within the ICT industry are included. (A) Sourcing from. This approach means to purchase a basic technology from a technology vendor which is included and basically hidden within the end product. (B) Re- selling. Here to product is not altered, re- branded or bundled in any way, hence diminishing the role of the ISP into a sales channel from the product providers' view. (C) Co-Branding. The product is sold under the ISPs name. (D) Joint development. At least two parties participate in the product development process.

2.4 Validation

This paper draws upon data collected through primary and on secondary data. The latter was gathered through literature research on product development within the ICT industry, with a special focus towards Cloud Services and Network Operators. A legitimate way to collect primary data so is in interviewing experts in the subject (Saunders et al, 2007). To get broadest possible spectrum of opinions, of each entity identified in the cloud value chain two companies were identified. Not all interviews are yet concluded, however, the goal is to interview Microsoft and Cisco as technology providers, Terremark and Google as Service Providers, Vodafone and Telefonica representing Integrated SPs and last but not least ComputaCenter and Dimension Data as Integrators. For a detailed overview of all planned interviews refer to **Figure 3**:

Figure 3: Planned interviews structured along the Cloud eco- system

In order to increase the validity and reliability of the qualitative data gathered it was combined with archival data such as press releases and information from company websites. Generally, triangulation with different types of data promotes richer and more reliable result (Jick, 1979).

Interviews have been chosen because they “are a major category of techniques for collecting data through questioning and are acknowledged as being some of the most effective ways of collecting data in the social sciences” (Lancaster, 2005).

In this study semi-structured interviews have been conducted, which are designed to cover a topic well-prepared in advance and is especially apt to validate a model based on grounded theory. Additionally this technique allows cross comparisons between participants and yet is flexible enough to pursue issues that arise during the interview – that way we were able to focus on the interview but where not limited by it. Wengarf (2001) also strongly recommends using an interview guideline and recording the complete interview for future reference.

Interviews are subject to “open- endedness” as every new interview might bring some new findings. Therefore, a higher number of interviews would make the findings more generalisable. However, the purpose of the research is not to generalize, but to gain new insights and form new theories. For future research, however, we strongly recommend to validate from a quantitative perspective our proposed findings (Whorton, 2009).

3 Findings

Important Note: Not all eight planned interviews have been conducted yet.

3.1 Importance of Cloud Services for ISPs

We were highly surprised when the first interviewee, a representative from an ISP, stated that “Cloud is important, however, it is not among our Top 3 priorities”. In all following interviews, that opinion has been confirmed and even validated with additional arguments. One technology vendor said “even so we would love to see big numbers here, for now, it is mainly a bet into the future”. This surprisingly conservative attitude towards B2B Cloud Services was based on many factors, however, the three most important are: (A) Addressable market relative to “Connectivity” (B) Very complex from the sales perspective (C) Strong competitors are in the market covering, covering already all deployment models (public, hybrid and private Cloud Services).

All interviewees also highlighted the (future) importance for Cloud Services provided by ISPs. They were particularly aware of (A) Using Cloud Services as a vehicle to connect customers or strengthen an existing relation (B) Strong growth potential of the Cloud Market, especially compared to shrinking core markets.

One of the most discussed arguments is “internationalization” of Cloud Services. Also some managers highlighted German laws and international price pressure as clear obstacles, all participants agreed that the possibility to leverage a Cloud Service globally demonstrates a key advantage for Integrated Service Providers.

3.2 Causes for ISPs small footprint in Cloud Services

As we summarized above, Cloud Services are not among the Top 3 topics for ISPs. For this reason the resources available for the product development are not as high as expected ex- ante. This is the main reason why Telecommunication Carriers are not among the top Cloud Provider. Besides this main factor the most mentioned reasons are (A) To slow product development, mainly due to too complex process and over engineering (B) Capital Expenditures are strongly reduced and mainly consumed by LTE / 4G roll- outs (C) Weak demand from sales indirectly dictates the prioritization of the product development.

To summarize it with the words of the Head of Product Management at one ISPs “there should be a global organization developing the Cloud Solutions customer want, not the ones we can sell connectivity with. Only this way we can gain the needed relevance – outside the classical product development”.

3.3 How collaborative product development could help

After evaluating the above described interaction matrix with semi- structured interviews we clearly come to the conclusion that there is no “one- size- fits- all” solution for product development. There are, however, very strong differences within the different types of interactions within the eco- system. (A) Sourcing exists with virtually all market participants, including competitive ISPs.

(B) Re-selling is exclusively done with very powerful pure Service Providers or Technology Partners. (C) Co- branding was also a viable option for all combinations, however, the ISP was always in a dominant position compared to the partner (D) Joint product development only occurs only with Integrators or Technology Vendors.

3.4 Recommended collaboration framework for product development

As stated above the interaction framework shows several patterns, however, no recommended strategy for ISPs could be derived. For this reason, the authors extended the interviews with several questions for segmenting the several possibilities of product development. **Figure 4** illustrate our suggest product development framework.

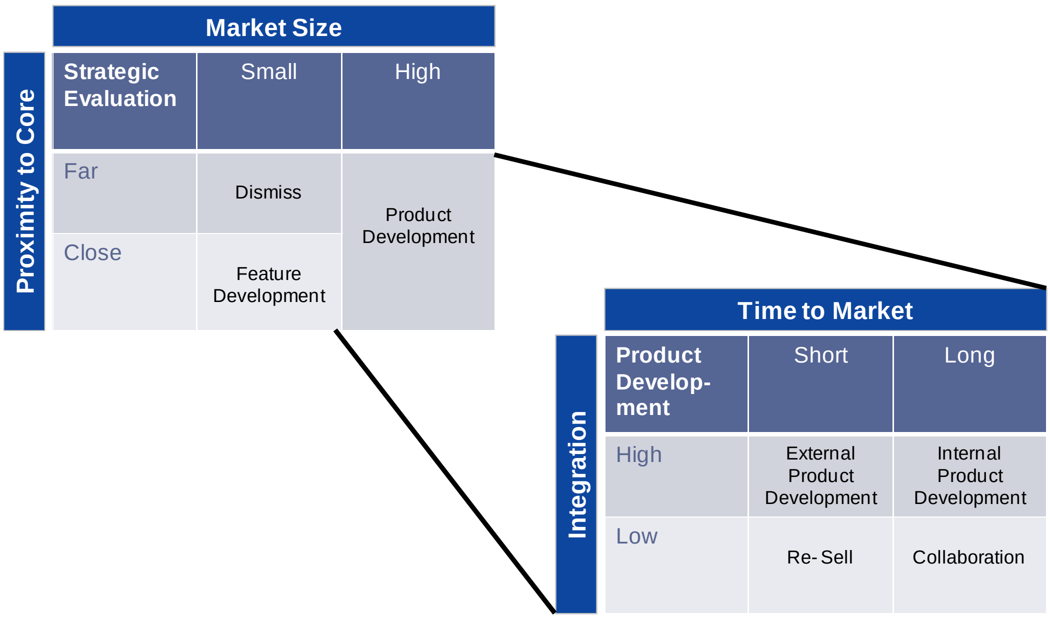

Figure 4: Product development framework for ISPs

All interview partners agreed that market size is of utmost importance for Integrated SPs. Due to their processes and strategies, products targeting at smaller markets can only be interesting when they do not require a proper product development process. In this case, small market size and close to core business, only a feature development process is needed which can be executed by technical departments. Good examples are tailor made security features for WAN connections. When the total addressable market is big enough product development should definitely be in the lead.
Product development should focus on two dimensions – technical integration and time to market. Based on the interview results, the authors argue that whenever a short time to market is essential the process should be externalized. If little integration is required, than re-sell should be the strategy of choice (i.e. Web- Conferencing) and if integration is crucial than an external entity should be the driving force and internal product development should act as a partner manager (i.e. Cloud Services at the current stage).

A more relaxed time to market suggests that most of the development should be kept in- house. For high integration efforts it should be completely internal, when the needed technical integration is rather low than a collaborative product development is recommended.

4 Conclusion and Outlook

Our starting point was the very strong assumption that Cloud Services are a number one priority for Integrated Service Providers. Our interviews proofed this wrong. This led to rather straightforward causes for the too slow product development process: Not only do ISPs have a strong tendency to over engineer their Cloud Services, but also tends the funding to be not sufficient.

Using the right interaction within the eco- system can add efficiency to the product development – both regarding time and money. There are a myriad of combinations, however, none of them is superior in all product development scenarios. For this reason we extended our interviews and identified the main factors: Market Size, Proximity to Core Business, Time to Market and Technical Integration. We developed two simple frameworks which shall guide throughout the product development process. Although the framework is not yet validated quantitatively, we are very confident that the framework will prove very robust both against quantitative and qualitative research.

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