Classification of business models with focusing on characterizing "as a service" offers

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A R T I C L E I N F O

A B S T R A C T

In the last few years, business on the Internet become more and more significance. On the other hand new development of Internet-based technologies like cloud computing "as a service" is changed rapidly. The business models have to be continually adapted and to be changed to meet the value exchange requirements related to these newest technologies. Therefore, this paper aims to provide significant classifying of the business models which leading enterprises in the market which can be offered directly or indirectly, with different type of offers, such as: (1) Infrastructure as a service (2) Platform as a service (3) Software as a service for characterizing the maturity of "as a services" business model.

1. Introduction

There are different offers and business models of web services (WS) are characterized and analyzed. The business models in the field of WS offers, which are presented in the literature, are still growing and immature approaches. As an introduction to the market analysis of the WS offers that are described as "as a service" paradigm (Föckeler, 2010; Hilkert et al., 2010; Bossert et al., 2010) we will give overview about the different levels of "as a service" offers.

Infrastructure-as-a-service (IaaS)

Infrastructure as a Service (IaaS) refers to a virtual machine infrastructure that is made available to the customer as a service. Customers can purchase storage capacity, network connectivity, and computing power on demand for any type of application. Unlike traditional hosting, this infrastructure is deployed in a multitenant architecture, allowing easy scaling to meet customer needs. The success factors of IaaS include a variable cost structure with a low total cost of ownership (TCO) and less need for IT infrastructure management. An example of this type of service is the Amazon Storage Provisioning Service (Simple Storage Service S3) (Chao, 2014).

Platform-as-a-Service (PaaS)

Platform-as-a-Service (PaaS) is built on IaaS by providing a software development and operating environment. PaaS customers can either extend existing solutions to include individual applications or completely redevelop their own applications. The platform offers developers' basic functions such as integration, user management or availability, which greatly simplifies the development of complex applications. The success factors include networking effects from the developer community, increasing the number of users and TCO benefits. An example of this type of service is Salesforce.com, which offers a PaaS development environment for the expansion of CRM software applications (Goyal, 2013).

Software-as-a-Service (SaaS)

Software vendors can use SOA to provide the software applications on the Internet as services to a larger number of users, thereby increasing their market share. In case of the SaaS, customers pay only for use and they do not need to install or operate the software. SaaS providers don't provide only the software, but also take care of maintenance, backups, regular updates and the security of data and applications.

The success factors of a SaaS solution are the decreasing TCO and the time to the market. Examples of this type of service are Google Apps (mail, word processing, etc.) enterprise SOA, model-based development and deployment as Software-as-a-Service (Zencke and Eichin, 2008; Bhardwaj et al., 2010).

Characteristics and attributes

By researching the literature on this topic, we have identified three relevant characteristics and their attributes that are suitable for the partial economical characterization of this business model. Through these characteristics and their attributes, one can answer the following questions (see Table 1 and Fig. 1) (Asfoura et al., 2009).

Table1: Cross of business model definitions by many researchers and experts in business model

Source	Characteristics			
	Integration grad in the Internet economy	The Actors And business fields	Products and Offered goods	Cash flow and revenue
Timmers (1998)		x	x	x
Amit and Zott (2001)		x	x	x
Heinrich and Leist (2000)		x		x
Afuah (2004)			x	x
Debelak (2006)		x	x	x
Slávik (2011)		x	x	x
Boons and Lüdeke-Freund (2013)	x			x
Reim et al. (2015)		x	x	x

- In which domain is this business model applicable?
- Which type of goods can be exchanged through this business model?
- To which extent will this business model integrate into the Internet-economy?
- To which type of basis model does this business model belong to?
- What is the source of revenue of this business model? Moreover, what are the forms of this revenue?

For focusing on related to "as a service" offers we have extended the previous captured characteristics (see Table 1) with the three types of web services which are (IaaS, PaaS and SaaS) to classifying the targeted group of enterprises in this research (see Fig. 1).

There are many business models, e.g., business to business (B2B), business to customer (B2C), customer to customer (C2C), customer to business (C2B), administration to administration (A2A), administration to business (A2B), business to administration (B2A), etc. In this paper we will focus on the most popular models which are (B2B), (B2C) and (C2C) (readers are referred to Asfoura et al. (2009) for more details). Not all products or goods can be traded alike through E-markets. There are many factors (related to the vendor or to the customer) that could affect the trading process. These goods are divided into two categories: Material goods and immaterial goods (Stelzer, 2000).

The integration's degree in the internet's economy depends on the ability to implement the transaction phases electronically.

Two forms are distinguished here: full and partial integration (Asfoura et al., 2009). The relevant 4-basic business models types are content, connection, commerce, and context (Wirtz, 2000). The fact is that most of business models belong to one of the 4-Basics types. A business model could be a hybrid of more than one type (Merz, 2002).

Characteristics	Attributes					
ID in IE	Full		Partial			
Business field	B2B		B2C		C2C	
Basic business models	Content	Context	Commerce		Connection	
Offered goods	Tangible Goods		Intangible Goods			
	Physical Products	Physical Services	Digital Products	Digital Services	Information	Special goods
Type of web services	Iaas		Paas		Saas	
Revenue sources	Products		Contacts		Information	
Revenue form	Direct and transaction dependent	Direct and transaction independent		Indirect and transaction dependent		Indirect and transaction independent

Fig. 1: Business model characteristics and attributes

The sources of Revenue of business models fall into three categories: Products, contacts and information (Wirtz, 2000). The forms of revenue were classified by Wirtz (2000). On one hand according to the players (i.e., buyers and sellers) into direct and indirect revenue and on the other hand according to the pricing conditions into transaction-dependent and transaction-independent (Wirtz, 2000).

In the next section, we will use Fig. 1 as basis for characterizing the core and supporting business models of some leader companies that provide a various types in the market that as "as a service" market analysis.

2. Analyzing the business models with focusing on "as a service" offers

WS offers on the Internet in the existing business models are classified in five categories on the basis of the following three criteria (the benefit aspects, the sector and the strategic importance of the WS offers) and classified into three groups of market participants (Nüttgens and Dirik, 2008). For further

explanation, the business models of these groups will be analyzed by the author of this work by a projection on Fig. 1. The resulting value flows through the exchange of WSs also will be modeled in this section with using use case maps. This modeling focuses on the activities and actors involved in the creation and use of fee-based WS offers.

2.1. Group A: Software developer company

This group includes two subgroups. Group A1: Business models of software companies that offers only fee-based WSs for direct revenue generation like Microsoft azure (see Fig. 2). Microsoft azure is considered as Software Company, which offers only fee-based WSs for direct revenue generation.

Microsoft Azure is one of Microsoft Corporation platform, which provide a comprehensive set of cloud services which belong to all types of "as a service" paradigms that developers and IT professionals use to build, deploy, and manage applications through global network datacenters of Microsoft (IaaS), Set of integrated tools, DevOps, and a marketplace (PaaS) can be used to support in efficiently building anything from simple mobile apps to internet-scale solutions, in addition to,, hosting applications (SaaS).
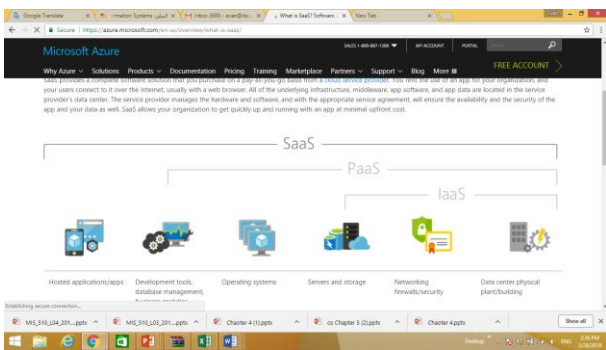

Fig. 2: Microsoft azure

Fig. 3 characterizes Microsoft azure business model as full integrated in internet economy because of the digital nature of its services and it focus on

B2B field and provides some service to the end users as B2C. The main revenue of this company is generated directly depending on the size of costumer use of the following services:

- SAP on Azure: Bring cloud scale and agility to your mission-critical SAP workloads.
- Data warehouse: Handle exponential data growth without leaving security, scalability, or analytics behind.
- Business SaaS apps: Use business insights and intelligence from Azure to build software as a service (SaaS) apps.
- Backup and archive: Protect your data and applications no matter where they reside to avoid costly business interruptions.
- Disaster recovery: Protect all your major IT systems while ensuring apps work when you need them most.
- Digital marketing: Connect with customers worldwide with digital campaigns that are personalized and scalable.
- Internet of Things: Create the Internet of Your Things by connecting your devices, assets, and sensors to collect untapped data.
- Digital media: Deliver high-quality videos to your customers anywhere, anytime, on any device.
- Mobile: Reach your customers everywhere, on every device, with a single mobile app build.
- E-commerce: Give customers what they want with a personalized, scalable, and secure shopping experience.
- LOB applications: Modernize your internal line of business (LOB) apps to meet today's IT challenges.
- SharePoint on Azure: Deploy SharePoint servers rapidly and scale as needed with a cost-effective infrastructure.

Microsoft azure provide additional free management and training services for supporting its core business.

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Business field	B2B		B2C		C2C	
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	Physical Products	Physical Services	Digital Products	Digital Services	Information	Special goods
Type of web services	Iaas		Paas		Saas	
Revenue sources	Products		Contacts		Information	
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Black color means core business model; Gray color means supporting business model
Fig. 3: Characterization of Microsoft azure business model

Fig. 4 uses use case maps to show the value exchange through Microsoft azure business model between the actors. Microsoft as and developer provider of three "as a service" products and end

user enterprise and developers as costumer or user of these paid web services).

Group A2: Business model of the software companies that, in addition to the distribution and

licensing of their software products, offer sufficient free WSs for strengthening their core business. As an example of this group, Google's business model is characterized in (Fig. 5).

Google (see Fig. 6) is a contextual business model as the world's leading search engine. The revenue of this business model is indirect revenue, because the revenues do not come from the sale of services, but from advertising other companies (as a B2B relationship).
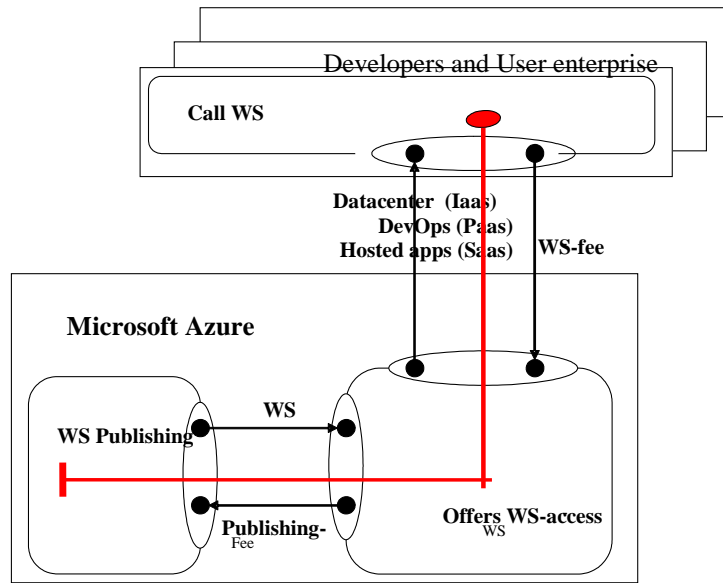

Fig. 4: Microsoft azure

Characteristics	Attributes					
ID in IE	Full			Partial		
Business field	B2B		B2C		C2C	
Basic business models	Content	Context	Commerce		Connection	
Offered goods	Tangible Goods		Intangible Goods			
	Physical Products	Physical Services	Digital Products	Digital Services	Information	Special goods
Type of web services	Iaas		Paas		Saas	
Revenue sources	Products		Contacts		Information	
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Fig. 5: Characterization of google business model

Fig. 6: Google web site

Google offers its services mostly free of charge and uses the large number of their visitors for advertising. The search services are the core offerings of this company, which are offered free of charge to users (that looks like B2C relationship).

Google also offers other services related to commerce, content, and connectivity models (such as shopping, videos, and emails). Web catalogs and search engines are established through Internet technology and the goods (services) offered in this business model are digital in nature. That is why Google business model are fully integrated into the Internet economy.

Google (as WS provider) offers free WSs under http://code.google.com (Manes, 2003). These WSs include "Google SOAP Search API," which allows developers (users) to access search results from their own applications rather than from a browser (as PaaS). These applications can further process the search results, which are returned as structured data (e.g. in XML format).

These applications include the automatic monitoring of the web for specific topics in specific periods, in order to obtain constantly new information on topics and to analyze the differences between the search results for specific topics and in certain periods for market research purposes (Manes, 2003). Google also offers an Application Programming Interface (API) for its Google Maps (as PaaS) in the form of interactive city maps (as

geoinformation). This WS is provided free of charge for use by the consumer.

Google aims through the two free WSs is to the developers and consumers to support its core business in order to expand its market share and to expand its market positioning as search engine (Manes, 2003). As a paid WS (which belongs to the business model 1) Google offers through its "Google Maps for Enterprise" (as SaaS) the integration of maps in intranets and non-publicly accessible applications with fee. That allows Google to generate additional direct revenue.

Fig. 7 illustrates an example of the value flows in the value-added activities between Google as a provider of the map web service (Actor), which develops and publishes this WS.

Google is expanding its business by brokering the free and paid apps (Apps Store) as SaaS, which are most widely delivered to smartphones. Through this intermediating, Google also generates indirect revenue from the developers through the one-time registration fee and brokerage commission of Apps sales. To support the apps providers, Google offers a free development environment in this context. The payment for the paid applications is handled via the Google payment system.
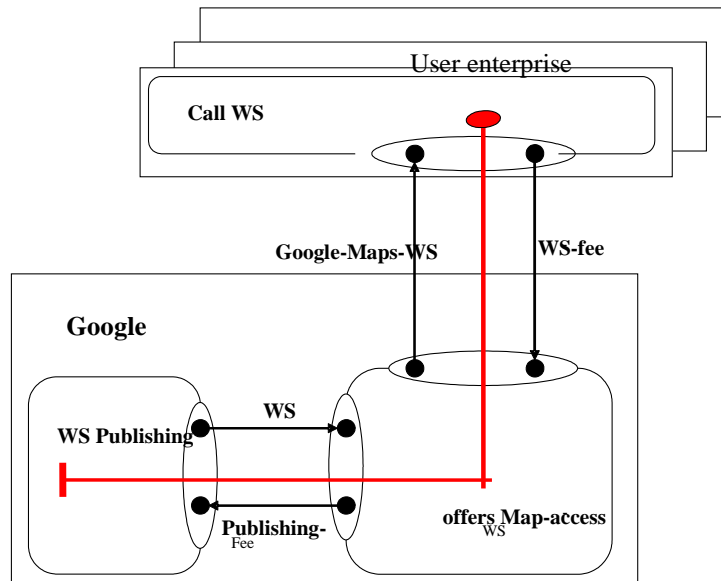

Fig. 7: Business model and value flows of Google Maps for enterprise offered as web service

The two business models (1 and 2) are ancillary business models introduced to support the company's core business. The direct revenues from these business models, which can be generated from the paid licensing of WSs, are hardly considered.

2.2. Group B: Companies with alternative core business

This group includes also two subgroups. Group B1: Business models of companies that are not software manufacturers but offer free WSs to support their core business. Group B2: Business models of companies their core business is not as software manufacturer but they build know-how in this area. These companies then offer their paid WSs to generate additional revenue through that.

Amazon which is characterized in Fig. 8 is a good example company that offers in both business models of group. Amazon.com (see Fig. 9) was founded in 1994 as a company, which was transformed to work online in 1995 as the largest bookseller. In the beginning, this company did not have any stocks (certain items at certain times), but since 1999 it has been stocking its customers more efficiently. In addition to books, Amazon sells music, electronics, software, and video games.

The core business field of this online bookseller is B2C commerce (as an e-shop), but Amazon also offers auctions for selling second hand new goods for. This company was supported by the Internet, and partially integrated into the Internet economy because the exchanged goods through this business model have physical nature. As a WS provider Amazon offers a free API for its online product catalog (as IaaS), which supports the online retailer by brokering the products of about one million advertising partners (affiliates) through accessing its online catalog and the integration into its own website. This corresponds more to the business model 3 (Nüttgens and Dirik, 2008; Manes, 2003).

In terms of business model 4, Amazon offers a Historical Pricing WS (as IaaS), which allows the developers to access the sales data of books, music, videos, and DVDs for the past three years as paid WS. Up to 60,000 monthly requests will be charged $ 249 per month. Sellers can use the statistics to make pricing decisions and to identify the trends of their own offers.

Amazon also provides a paid "Simple Storage Service" (IaaS) that allows developers to store and retrieve any data on the Amazon servers. The monthly fee for using such a service depends on the

size of data storage and data transfer (Nüttgens and Dirik, 2008).

Characteristics	Attributes				
ID in IE	Full		Partial		
Business field	B2B	B2C		C2C	
Basic business models	Content	Context	Commerce	Connection	
Offered goods	Tangible Goods		Intangible Goods		
	Physical Products	Physical Services	Digital Products	Digital Services	Information	Special goods
Type of web services	Iaas	Paas		Saas	
Revenue sources	Products	Contacts		Information	
Revenue form	Direct and transaction dependent	Direct and transaction independent	Indirect and transaction dependent	Indirect and transaction independent	

Fig. 8: Characterization of the business model of Amazon

Fig. 10 shows an example of the value flows when exchanging values between Amazon as the provider of the "Simple Storage Service" (Actor), which develops, publishes, and stores the WS, and the developers as customers (Market Segment) pay to Amazon for WS usage depending on the size of data storage. However, Amazon pays the cost of publishing, provisioning, and data storage activities for the WS offer.

The revenues generated by this business model are:

- Direct and transaction-dependent revenue through the selling products to the client.
- Indirect and transaction-dependent revenues through the provision of transactions between the providers and the customers.
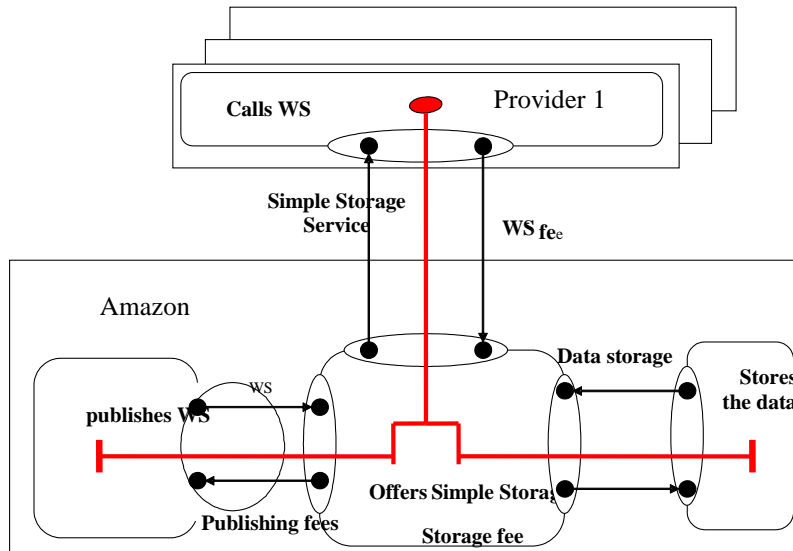

Fig. 9: Amazon website

Fig. 10: Business model and value flows of offering "Simple Storage Service" as web service (IaaS)

WS offers by like this business models aim to support the core business and to add new sources of revenue. However, the direct revenues from these offers are still relatively low.

2.3. Group C: Include broker business model

This group represents the fifth business model as Broker (Mediator), which mediates between the WS providers and customers. The intermediation

appears in various forms (Nüttgens and Dirik, 2008), such as:

- Advisor to assist the providers by identifying appropriate WSs.
- As well as the combination of WSs into a service portfolio.

The traditional role of the broker in service-oriented architectures is as Service Registry (online directory) as a well-arranged database where the providers publish the information about their WSs and the customers can find the appropriate WSs (Dustdar et al., 2003; Küster, 2003; Bichler, 2001).

Fig. 11 shows a WSs broker which intermediates the connection between the WS providers and the WS requester (costumer).WS customer can find the appropriate WSs through the mediator which intermediates the information phase (as e-catalog) and negotiation phase against the customer (from transaction point of view). The other transaction phases (such as delivery and payment) are usually executed directly between the provider and the costumer.
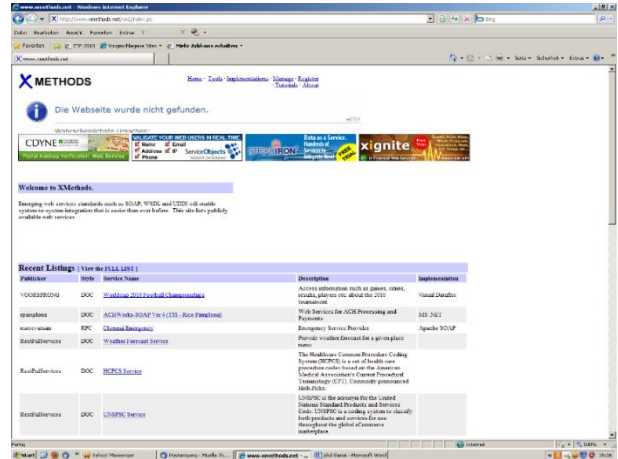

Fig. 11: Xmethods directory web page

The mediator in this form looks exactly like an online auction between the customers and the providers. This role can be expanded to advise and combine WSs. As an example of this group, is the business model of xmethods.com (see Fig. 11 which is characterized in Fig. 12).

Characteristics	Attributes					
ID in IE	Full			Partial		
Business field	B2B		B2C		C2C	
Basic business models	Content	Context	Commerce		Connection	
Offered goods	Tangible Goods		Intangible Goods			
	Physical Products	Physical Services	Digital Products	Digital Services	Information	Special goods
Type of web services	Iaas		Paas		Saas	
Revenue sources	Products		Contacts		Information	
Revenue form	Direct and transaction dependent	Direct and transaction independent	Indirect and transaction dependent		Indirect and transaction independent	

Fig. 12: Characterizing the business model of xmethods.com

Xmethods.com (Fig. 11) provides online directory services that allow companies (or developers) to publish their WSs to find the buyers of appropriate WSs. The offered descriptions and information about these WSs have of course digitizable nature.

The revenue of this business model generate indirectly through provision fees and advertising paid by the provider companies (as a B2B relationship). But there are no cash flows with the private buyers (as B2C relations).

Fig. 13 provides an example of the value flow during the exchange and value-added activities between Xmethods as an intermediary (Actor) which publishes the WS in its online directory, the WS developers (Market Segment), and the WS Users (Market Segment) the users (customers) pay to the WS developers for WS usage. The developers pay the provision fee to Xmethods. Because the placement of the WS offers the broker still an initial approach and can be adapted for the better use of distributed information systems as WSs.
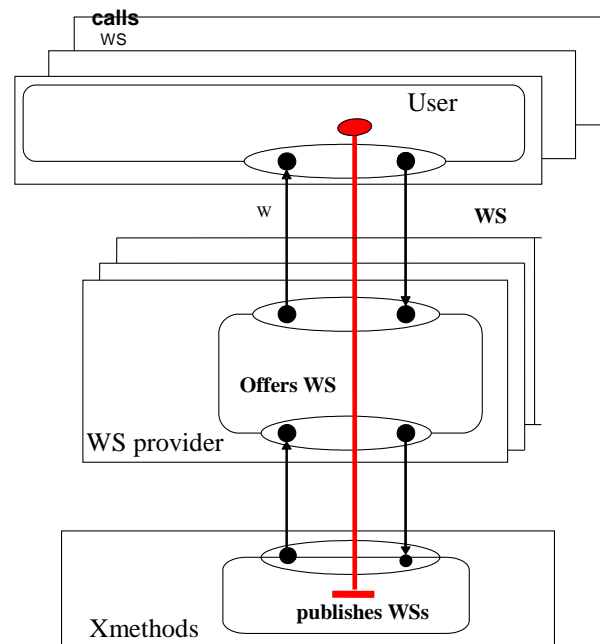

Fig. 13: Business model and value flows of the WS brokerage of "Xmethods"

3. Conclusion

In this paper, we presented significant characteristics that has be collected and integrated as suitable basis for business model characterization. We used these characteristics for classification and characterization the business model of deferent enterprises as leading companies that provide different types of web services to analyze e-market with focusing on "as a service" offers. This analysis was to give overview about the maturity of "as a service" business model in the market.

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