

## A Study for Software-as-a-Service Accelerating Business Innovation

### Introduction

In a lot of studies for services, providers and clients are assumed to be people. However, innovations born in the incubator of the Internet challenge these assumptions. When people use a service, data are exchanged between computer systems in the process. If it is recognized that a system provides the service to another system, the concept of service, which formerly required a person-to-person or person-to-machine or system relationship, needs to be enhanced. On-demand services on the web are expanding rapidly. One reason is that Google map software is used to show the position of shops on the web page, or goods which are dealt on Amazon.com are sold on some person's own web page. In this case, new value is created by combining existing technologies. In this paper, I will analyze the innovations born from on-demand services on the web from both the technological side and the management side and clarify what made the innovation succeed. Chapter 1 reviews the early research on services, and considers the definition and the features of services. Traditional discussions make the assumption that services are provided by people. However, I would insist it is necessary to enhance the concept of services exchanged between systems because traditional discussions cannot sufficiently explain the services provided from system to system. In Chapter 2, SaaS for which software is used with on-demand is taken up as an example of service between systems. I would point out that both provider and client of service are able to develop it from the person to the system by opening the interface (API) to the public. In Chapter 3, why opening the interface on the web to the public is related to competition between enterprises and rapid development is analyzed based on the case of Amazon and JTB, which is a big and famous travel agent in Japan.

### 1. Discussion concerning services

#### 1.1 Traditional view of services

Fisk et al. classified it into three following stages by analyzing an English document of 1000 or more concerning the service marketing for 40 years, and using the frame which used the metaphor of person's evolution. At the first stage is "Crawling Out (1953-79)", the second stage is "Scurrying About (1980-85)" stage and the 3rd stage is "Walking Erect (1986-present)". It is an analysis assumed publication 120, 287 and 720 in each stage. At the first stage, the difference of the marketing of the commodity and service was discussed, and, as a result, intangibility, inseparability, heterogeneity and perishability for service were brought into relief as a characteristic different from the goods. At the second stage, a new rival appeared in the field of the airline, the financial service, the health care, and the communication service in the background of deregulation in the service industry of the United States, and the inter-enterprise competition became violent. At the third stage, the point under discussion shifted to the research in service marketing.

The publication has increased explosively with the researcher concerning the service marketing. However, a cohesive core of research could not be identified, the discussion about the topics for Service Quality, Service Satisfaction, Service Encounter, Service Design and Internal Marketing were deepened.<sup>1)</sup>

Furrer and Sollberge classified into the main theme of 27 from 927 articles in service marketing for 11 years from 1993 after study of Fisk et al. The topic to the fifth after the first half (From 1993 to 1998) was Service Quality, Customer Satisfaction, Consumer behaviors/ behavioral intentions, Performance and Strategy. However, the order changes places in the latter half (From 1998 to 2003), Consumer behaviors/ behavioral intentions, Customer Satisfaction, Service Quality, Performance and Strategy are the fifth high rank places.<sup>2)</sup>

Service has a feature different from goods so that Fisk et al. had shown in the comparison analysis of the goods marketing and service marketing. As for service, the exception was often treated in economics, because the right which corresponds to the property right for goods does not move even if service is provided. The intangibility of the service has been emphasized. The disappearance or the volatility of service comes from the fact that it disappears once service has been provided. In short, service cannot be stocked in the same way as goods, until being consumed like a product. Because production and consumption are generated at the same time, it is difficult to pursue the scale economy. Moreover, the content is different according to the provider, even if the same service is provided. Even if the same provider offers the same content, the value might be different according to the situation on the consumer side. The discussion about these services makes the assumption that a person provides the service. When we see the definition of service in the early studies, we could understand it.

Kotler's definition as follows:

*A service is any act or performance that is essentially intangible and not result in the ownership anything. Its production may or may not tied to a physical product.*<sup>3)</sup>

This definition appropriately adopts the feature of service. Looy et al. has a different definition of services as:

*All those economic activities that are intangible and imply an interaction to be realised between service provider and consumer.*<sup>4)</sup>

This definition is different from others in that it enhances the interaction and all the economic activities. It is difficult to expand the concept of service between the person and the system, and between systems based on these definitions. Therefore, we should review service from a higher level.

## 1.2 Service Science

It is said that service science began with the research conducted by Chesbrough (University of California at Berkeley) and the team formed by IBM in 2002 at the Almaden Research Center. Service science aims at the improvement of innovation and productivity by researching service, using the techniques of simulation and engineering, etc. Chesbrough insists that innovation is important for service, which comprises the majority of economic activity, though analysis of innovation was centered on products up to now (Chesbrough, 2005).

Though the age as the hardware manufacturer was long for IBM, its dependence on hardware has decreased recently, and IBM has shifted to the solution business, including sales of software and consulting, etc. The goal of IBM is to create a service area to develop a technological application to enable organizations such as enterprises and governments to improve present business and to advance into new fields. "Service Sciences" is a concept

that IBM first advocated. Interdisciplinary knowledge of diverse fields such as psychology, organization, enterprise management, and ICT (Information Communication Technology) concerning service is necessary. IBM emphasizes the academic systematization of Service Science and is trying to spread this notion (Spohrer and Maglio, 2006).

In December, 2004, the CoC (Council on Competitiveness) of the United States announced the results of a 15-month study by Innovation America, a group of 400 leaders of the industrial world, academic circles, the government, and labor. In this report, it is concluded that there is no competitive edge except in innovation in the world of the 21st century, where a lot of countries become rivals to the United States. It proposes a concrete policy encompassing (1) human resources, (2) the investment side, and (3) the infrastructure side, aiming at economic construction to support innovation (CoC, 2004). Innovation America points out that new multidisciplinary approaches are needed as follows:

*Nowhere is the need for new multidisciplinary approaches clearer than in the area of emerging "Services science" – the melding together of the more established fields of computer science, operations research, industrial engineering, mathematics, management sciences, decision sciences, social sciences and legal sciences that may transform entire enterprises and drive innovation at the intersection of business and technology expertise.<sup>5)</sup>*

This report is a result of centralizing the headquarters committee. The reason for calling it the "Palmisano Report" is that Palmisano, who is the CEO of IBM, and Clough, who is President of Georgia Tech, are the joint chairmen of the headquarters committee. It can be said that "Service science" was acknowledged by IBM, which brought the issue to the national level.

That the research area was narrowly specified suggests the necessity of a newer approach to "Service science." This was pointed out by Innovation America. Afterwards, IBM aimed at services, and then at suitable SSME (Service Science, Management, and Engineering) for not only the science but also for an interdisciplinary approach on the management side and the engineering side; the name change and the spread of the concept is aimed at this. When IBM said "Service Science" for the research on service, they defined services as follows:

*We defined services earlier in term of clients and providers working together to transform some state (usually client-owned stated). But it turns out that defining services is not easy (Spohrer and Maglio, 2006).*

After IBM develops from the service science to SSME, service is defined as follows:

*A service is a provider/client interaction that creates and captures value.<sup>6)</sup>*

As for service, we can understand that it is not to require a person any longer by this definition.

### 1.3 Services between systems

Notions of service have developed—from the stage of person-to-person to system-to-person and finally to system-to-system. Service from provider to client, which was previously one-way traffic, might now include an exchange of data between the provider and the client on the web. I would like to include this interaction in the definition of service. As for the content of service, the function and the data of a program are now exchanged between systems, though the offer of labor, such as cutting hair or baby-sitting is mainly conducted between persons. As follows, I would like to define service to reflect this reality: Providers offer clients the labor, the function of software, and data, etc., by which value is added. Providers and clients are not necessarily persons. Both might be

systems. When both are systems, the function of software and the data are interactively exchanged.

Service by this definition has a feature different from the service between persons. There is a difference, for example, in beautician's technology when the hair is set. Therefore, a difference in service is performed. However, the content of service does not change because the service between systems is made by a program beforehand. There is a difference in processing time because of differences in hardware, OS, network, etc. Moreover, the generation and consumption of service are done at the same time and disappear soon. It differs from the service that a person does, as there is reproducibility. If the same program starts, service can be provided with similar processing. When the provider is a system, it has the feature of a constant quality: 24-hour operation and accurate processing are guaranteed by the automated procedure. The point of intangibility of service, and that the property rights do not move, is the same. I will analyze the service provided by on-demand in the next chapter based on this definition.

## 2. Software as a Service

### 2.1 What is SaaS?

SaaS (Software as a Service) is to offer/use the function of software through the Internet. The provider preserves the data and software for each customer in its own server. The user connects with the provider's server and uses a necessary function for its company. If the terminal can connect with the Internet and has browser software, the client uses the application software on the supplier site. The client can save work and cost according to the upgrade.

A similar service was provided by ASP (Application Service Provider) in the latter half of 1990's. The following background describes it. It is necessary to develop information systems according to new commodities and service and existing systems promptly for the enterprise to improve its competitive edge. As for information systems for mission-critical business, originality is required because it is one of the factors that differentiate it from other companies. Therefore, information systems are voluntarily developed, or package software is used. A deliberate customizing is done in the latter case. Other information systems' daily outsourcing with on-demand has increased.

The point that ASP and SaaS also exchange software over the Internet does not essentially change. However, the communication environment was drastically improved these ten years. For instance, we are able to use the Broad bands such as ADSL (Asymmetric Digital Subscriber Line) and FTTH (Fiber To The Home) at a lowest price in the world. The supplier side came to be able to control server cost and operation cost by shifting from the single tenant method to the multi-tenant method. Suppliers also came to be able to provide service at a low cost compared with the user. As a result, the virtuous circle that the number of users increases again follows. As for the multi-tenant method, because two or more customers share the server and the database, the unit price becomes cheap, while the single tenant method prepares the server and the database for each customer.

### 2.2 Feature of SaaS

What is the advantage of the SaaS introduction for the user? One is that it the service can be introduced in the short term and used immediately. With the privatization of Japan Post by the Ministry of Posts and Telecommunications, the use of the on-demand service of Salesforce.com as a customer information management system was initiated in October

2007. One big reason to adopt it was that it could be developed in the short term. Japan Post judged that there was not enough time to install and customize the company's in-house package software only for the development period of the post half a year, and selected the on-demand service. If they were to develop the package software at their own expense, it would become a long-term project. They would have to train for maintenance, procure hardware (terminal unit for the server machine and the client, etc.), LAN, systems of operation, and workers, etc.

Certainly, I want to point out that the newness of an organization is one of factors that will determine SaaS introduction, though the request of the system operation in the short term was a key factor in the selection of SaaS for Japan Post. In short, an individual business processing procedure for continuing for a long time is established, and to be compatible with the procedure, the information system has been developed in traditional enterprises and government offices in Japan. Therefore, there are a lot of individual developments, and the market for package software has not expanded because it cannot correspond to other package software.

Another big reason to introduce SaaS is that a great cost reduction can be achieved, because no cost is generated for the company in terms of development or operation. Moreover, the large license fee and customizing charge associated with package software are also unnecessary. The fee system of general SaaS is a subscription method. That is, there is a monthly fee per terminal unit. It is reasonable to be able to adjust the charge in proportion to the number of users. However, when the use period becomes long, and the number of terminal units increases, it is certain that the use charge will also increase. When SaaS is installed, how long SaaS will remain installed will be decided, compared with the cost when the company's in-house development and the package software are used. The charge of SaaS sets the use period and the number of terminals, and the charge is calculated accordingly. This trial calculation will become good data when negotiating the charge with the supplier of SaaS. Flexibility increases on the accounting treatment because the charge becomes a variable expenditure.

The use of SaaS is not by itself a good point. It depends on the telecommunication line because it is an on-demand internet service. It is necessary to be able to connect easily, with good quality and without crowding, and to run the system efficiently so as not to cause the problem of slowness, etc. It is necessary to confirm whether the service's security policy is sufficient, because its own valuable data is kept on the same network used by an opponent enterprise. The application offered by SaaS must be customizable according to the needs of the business, to be compatible with an existing system so that there will be no problems.

### 2.3 Service between systems

It is possible to classify services into two types by looking at the use of SaaS. One is a type whereby the application of the correspondence which exists in the provider operates when a person connects with the provider of SaaS and necessary data is input. The processing result is transmitted to the terminal unit, and a browser displays it. In short, this type occurs when the client is a person and the system is the provider of service. In the other type, the provider and the client are both systems. The application of different websites is mixed in the recent Web2.0, and a new function (value) is created as shown in the mashup improvement. Finally, it is processed, though a person occasionally sees the terminal unit by the computer program, which is cooperating. We can recognize that service is automated in this way.

It has been shown in the exchange of a service between a system and a person that a

person can correspond flexibly no matter what occurs. However, it is necessary to anticipate any possible occurrence for system-to-system services and to decide correspondence beforehand. The specification in the interface on the web is decided at one of the SaaS of the correspondence. This is called API (Application Program Interface). API is information on a necessary function for originally making the application and the software which operates on OS such as Windows, the procedure, the variable, and the data structure, etc. However, the concept needs to be expanded. Necessary information is called API when other sites on the Internet are used as services, and information necessary to make the game software which operates on the gaming machine for Nintendo and Sony is also called API. That is, API is provided, and the communication of the service between systems will be processed automatically according to it without the intervention of a person. Web API is a window where software that is open to the public and data on the web can be freely used as services. In this paper, I would like to narrow the focus of SaaS to this type of API and consider it from the aspect of service between systems on the web.

### 3. Business innovation by SaaS

#### 3.1 Opening API to the public

Because opening API to the public means its own business resources are opened to the public, it is closely related to the management strategy of the enterprise. Windows API is mounted as a library of OS so that Microsoft Corporation may spread Windows as a platform for the personal computer, and it has been sold with OS. As a result, API came to be well-known. The application developer made the communication with OS a Black Box, and it can be developed by concentrating only on the application. The application developer is expected to increase rapidly. Then, a lot of applications will be born, and the software that survives the competition will be used for a long time as a commodity.

On the other hand, API of PlayStation is limited to the developer who licenses it and has been exchanged for Sony. Because of the huge development cost, both parties employ strategies that limit the developer rather than allow free competition. This has given them an advantage in recent game software.

If it was a simple website searching that the person inputs the key word on the Internet and the result is displayed on the screen, API was unnecessary. However, the enterprise opened its own API to the public, which the manager of an interested website connects to his own website, and free access to the commodity database is permitted, and will offer services via payment API. In past common sense, the database and the information systems, which are search goods system or payment system of the enterprise, were inaccessible to a public user. However, in the next section, I introduce the case where new value is created by the strategy of opening web API to the public.

#### 3.2 API and business innovation

##### (1) The case of Amazon

In this paper, I would like to analyze the issue of opening API to the public, because the study for one click service, CRM, customer review, and e-Marketplace at Amazon.com have already been discussed. I would previously like to describe the following conclusions: (a) customers could be able to access goods database in Amazon by API, (b) even the person who does not have capital or a shop could be able to have a shop on the Internet by using the payment API, (c) website operators could be able to target the goods in the long tail area in Amazon by the mashup improvement. I could consider that these synergy effects achieve the innovation, and it contributes to the creation and the expansion of the

Amazon economic bloc.

Amazon opened "Amazon Web Service (AWS)" version 1, which is e-commerce API, to the public in July 2002. AWS corresponded to Amazon and e-Marketplace in November 2002. AWS was changed to the name that called the entire Amazon API at the same time as AWS's being changed into "Amazon E-Commerce Service" in October 2004.<sup>7)</sup> The enterprise and the individual made available the bibliographic data of books, music titles and their artists of CDs, movie titles, actors, and producers of DVDs on their websites and blogsite by using AWS. This means that the sales agents for Amazon increase. The commission goes to the manager of the blogsite when the goods on Amazon.com are clicked and some person buys something from an individual blogsite.

It is expensive to collect of merchandise information and to construct the search engine. Merchandise information is one of important resources of a business. It is certain that opening it to the public through API is an efficient way for many people to access the goods. However, opening API to the public requires high-level decision-making. Opening API of the merchandise information retrieval to the public contributed greatly to the creation of the Amazon economic bloc, which made Amazon a dominant website and blogsite.

Amazon opened Amazon Payment API, which is "Amazon Flexible Payment Service (Amazon FPS)", to the public as a limited beta version for the developer in August 2007. Now the managers of websites and blogsites can use this payment mechanism between Amazon and customers. The workload for small and medium-sized enterprises and privately owned companies is too large to correspond to them, considering the large number of customer payment forms (credit card, bank transfer, and check, etc.) and customers' financial institutions themselves. If the payment system of Amazon could be available the API, the workload becomes manageable. If the goods search function and the settlement mechanism can be used, even the individual who does not have capital or land can have his shop on the Internet. Goods can be rearranged from the way in which they were introduced on Amazon, partially on my blogsite, but also on the many shops on the Internet. It is as if a franchisee on the web is made by Amazon, the franchiser. I would like to evaluate an example of how opening the settlement function API to the public contributes to the expansion of the Amazon economic bloc.

Now I will evaluate a service that exchanges between systems know as "Mashup." ZonTube<sup>8)</sup> is a mashup site of Amazon.com and YouTube. When you enter the word and click the search button, both Amazon.com and YouTube retrieval results are put out. When you find music you like at YouTube, you can buy it at Amazon.com. The retrieval result of Amazon.com and the retrieval result of YouTube are displayed at the same time, as well as ZonTube and AmaTube<sup>9)</sup>. Thus, there are a lot of mashup sites of Amazon.com and YouTube. When you buy goods, it is useful if there are Amazon.com, other shopping sites, an auction sites, and comparable sites. I will introduce Bestbuyszone<sup>10)</sup> of Britain and AmaSear<sup>11)</sup> of Japan. Both are mashup sites, each using API.

Bestbuyszone is a mashup site using API of eBay, Shopping.com, and Amazon E-Commerce Service. Bestbuyszone covers a lot of goods, such as consumer electronics, computer software, jewelry & watches, and kitchen goods, etc. However, when we want to compare goods which are on other shopping or auction sites, we can click the icon of "Shopping.com UK" in other shopping sites or click the character string of Advanced Search which connects with the auction site in eBay and input the goods data on the site. In short, prices of goods cannot be compared on one screen.

On the other hand, AmaSear is an application developed by a Japanese man, his first name is Masahiko. When it is operated, a comparison screen with tabs for each shopping site of Amazon.co.jp, Japan, and famous shopping and auction sites, such as

Rakuten, which is the largest online shopping site in Japan, Yahoo! Japan, and “bidders” are displayed on one screen. [Fig. 1]

[Fig. 1 AmaSear: shopping comparison engine]



When you click the tab, the screen of the corresponding site is displayed. Then, you input the specified goods data and retrieve the goods. If the goods are stocked, the price is displayed. It is comprehensible because it is displayed on one screen. It is possible to set it to send E-mail to notify customers when out-of-stock items become available. However, this is an Amazon limitation. These sites have created new value that did not exist before. Especially, the mashup site often matches some goods and original aspects to other goods. I would like to point out that there is a possibility to direct attention for the goods at the long tail area in Amazon.

## (2) The case of JTB

JTB is a travel agent that represents Japan. In the travel industry, it is a common procedure to advertise through media of TV, newspapers, and magazines, etc., and the customer applies to the shop. However, sales on the web are expanding now. JTB has forecast the expansion in 2010 from 25 to 30%, though online sales were about 10% of the total sales in 2006.

The customer has the following advantage, though the advertisement and the travel applications on the web might be merely one sales channel for the travel agent. The customer can apply for travel on the web 24 hours a day, even if there is no travel agent near his home. Conducting application procedures on the web is an innovation in the first stage. Because we cannot experience travel beforehand, we often make decisions referring to information provided by other persons who visited the locale in question.

Customers are likely to refer to the voyages or record of travel on the web sites as



they search for travel destinations. The travel company that places such information on the web competes with other companies and is dominant for a while, but the other companies keep pace by placing similar information on their own sites. Thus, the information changes to a commodity, and the competitive advantage is lost. Now since the website of the travel company is popular, JTB opened API, which can have made its own travel information available freely to the public. It costs money to provide travel guide information, including coverage to the various locales, etc., compared with making merchandise information on the book, CD, and DVD. The strategy to open the valuable travel guide information to the public will be added as an innovation of Web 2.0.

Many people own blogsites because it has recently become easy to establish individual blogsites in Japan. Information about voyages is good materials for a blogsite. A blogger can describe voyages by concentrating on both happy and unhappy experiences; he can also display the outline of the travel with information drawn from the travel agent. The reader of the blog of the travel agent web pages worries that the travel agent might have edited the information. But the reader believes the voyages described on an individual's blogsite reflect the blogger's personal opinion. The reader impressed by these descriptions of the voyages will want to go to the site. It is difficult to calculate the value, especially in terms of quantification and visualization at the time of providing service like travel. If an API is opened to the public, the provider can collect information on the voyages from a blogsite of the user who has accessed it. If text-mining technology is used, the road to a quantitative evaluation can be opened.

If user's satisfaction rating is high, he becomes a repeat customer because the interaction of service between the provider and the user is large. The tendency of the potential traveler to trust the information on the travel experiences of another person more than information offered by the travel company is high. Anyway, the strategy whereby a company opens its own travel API to the public in advance of other companies, and ultimately increases travel applicants is effective as one way to achieve the goal of taking the lead in the travel industry in Japan.

## Conclusion

In this paper I expanded the notion of service which had made the assumption of placing a person at the center of the service between systems and proposed an inclusive definition from the person to the system. I clarified the big role innovation played on the web page of the Internet API, which enabled the communication of the function of the program and data between systems of the site, and how the opening of API to the public played an important role in the cases of Amazon and JTB. Many users gain a large benefit through API, who can use merchandise information on a famous, huge website free of charge. Nevertheless, API has also appeared on improper sites. I would like analyze this problem in the future.

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## Note

1) Fisk et al. (1993) "Crawling Out (1953-79)" stage: p.63, "Scurrying About (1980-85)" stage: pp.71-72, and "Walking Erect (1986-present)" stage: pp.74-82. "1986-present" means "1986-1993".

- 2) Furrer, Oliver and Sollberger, Pierre (2005) p.18, Extraction top 5 from “Table2: Theme Frequencies per Period”.
- 3) Kotler (1994) p.464.
- 4) Looy et al., (1998) p.5.
- 5) CoC (2004) p.58.
- 6) IBM Research, Service definition.
- 7) Yoshimatsu, Fumiaki (2005) p.68. “Table 1 History of Amazon Web Service,” but this article is Japanese.
- 8) ZonTube (<http://pulp-site.net/zontube/>)
- 9) AmaTube (<http://amb.tagajo.tv/>).
- 10) Best Buys Zone UK (<http://bestbuyszone.co.uk/>).
- 11) Web page of Masahiko who is the AmaSear creator (<http://www5.plala.or.jp/visage/>).

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