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Building E-Service Systems:From Planning to Implementation

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Abstract

For building e-service systems, this paper discusses the difference between traditional system integration and e-service system integration. First, e-service systems should be planed by more than two companies who have different core competences. Second, project manager who builds an e-service system should integrate not only hardware nor software but also digital contents. Third, e-service systems are developed not for cost reduction but for customers' satisfaction. Paying attention to these points, this paper presents components, risks, building procedure, and office role for building e-service systems, and reviews our experiences.

1. Introduction

System integration is to build an application system by selecting components and connecting them. It is an important activity for system engineers. It includes system planning, transaction analysis, data base design, function design, implementation, and maintenance.

At current Internet era, there are new views for system integration. For building traditional systems such as banking system and inventory system, water- fall model [1] and rapid prototyping model [5] were well known to the project managers. Then there is the decisive question whether or not traditional project management works also for e-service project. Stoehr, T. provides 99 key success factors for managing e-business projects [9].

From our perspective, the traditional models can not be applied to e-service system integration because of three reasons while the target of e-service system is to transform our current life style and work style to new styles by using Internet technology (IT):

(1) The e-service should be planed by more than two companies who have different core competences. Some companies have competence for system building while others have competence for electronic payment, logistics, system operation, human resources and so on [2]. In fact, Nikkei newspaper in Japan delivers new alliance articles everyday.

(2) For building an e-service system, a project manager should integrate not only hardware nor software but also digital contents. Currently a variety of digital contents for education and entertainment are provided. Contents aggregation from a volume of contents holders is attractive movement for customers [10].

(3) In general, the traditional systems were developed for restructuring companies' business process [3]. There were chances for cost reduction assessment. Therefore, it is possible to calculate cost analysis for investment. However, e-service systems are developed for customers' satisfaction and their convenience [8]. The price for service is often not decided by its cost but consumers' value [8]. Then we should pay attention on business risk. So, methodology for risk/chance analysis is indispensable for building e-service systems.

Paying attention to these reasons, we develop new framework and concept for physical office for building e-service systems. Without framework, the system integrator misses the project management. With framework, the system integrator can recognize his capability maturity for building e-service systems. Our framework presents the components, the risks, and the procedure for building e-service systems while the e-service creation center is a physical office for an e-service development.

2. Components for e-Service System Integration

Let us review the difference on components between the traditional systems and the e-service systems first.

For the traditional system integration, a system integrator selects hardware and software for the system infrastructure. Then he designs application program. For his selection, he has to analyze cost/effect and transaction volumes. Of course, the system integrator may outsource program development resources.

Comparing to the traditional system integration, we have identified four points for the e-service components as follows:

(1) A project manager should integrate not only hardware and software but also digital contents. Digital contents should be identified widely. In fact, there are digital contents not only for the entertainment and the education but also those for the hotel room reservation and the airline ticket reservation. To integrate a variety of contents from a volume of contents holders is called contents aggregation.

(2) User interface design is important issue because the user is not a professional person but a general consumer. There are variety of user terminals such as personal computers, mobile phones, personal data

assistant, and internet appliances. Data synchronization among them is an important function for mobile computing. The ubiquitous computing concept that allows us to use computer anywhere and anytime is also important.

(3) Resource outsourcing is a key factor for early service development and risk sharing. Not only application development but also system operation requires professionals. For the system operation, both iDC(internet Data Center) and customer support center are generally outsourced. A system integrator should understand the core competences of outsourcers and subcontractors, and should evaluate them.

(4) SLA (Service Level Agreement) is an important concept for pricing. A service integrator should clarify the service level for customers and pay the penalty if the service level is degraded. Sometimes customer may prefer the price to the quality. Excellent quality is not always key factor for service selection nor customer satisfaction. Then SLA becomes a clue for service selection.

We propose the components in our framework as shown in Figure 1: Elements for integration, implementation outsourcing, operation outsourcing, and customers/sales channels. "Aggregation" and "Service level agreement" are keywords for integration.
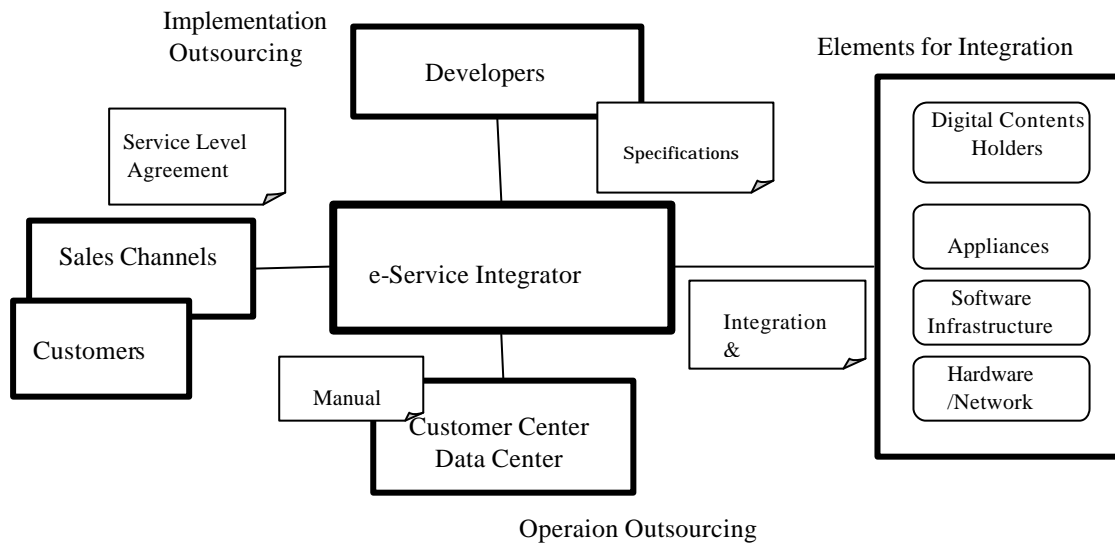

Figure 1. Components for building e-Service Systems

3. Risks for e-Service Integration

While e-service is attractive for current era, there are risks for business creation. We should recognize that there should be risks. To avoid risks is meaningless. We should know what the risks are, and what their probabilities of the risk are [11]. To recognize the existence of risk, let us consider the changes in the current market. There are two big changes as follows:

(a) As mentioned in section 1, most e-services are implemented by more than two companies. Each company has its unique core competence. Figure 2 shows the alliance network among companies for e-service integration. Note that the traditional alliances were done by the companies that have the same (or similar) competence.

(b) The consumers have gotten the power to collect and deliver information via internet. Sometimes, the consumers make an electronic community to exchange information among special interest group [4]. Without load, time, and money, the internet users are able to know the product differentiation, their inventory, and their price [8].
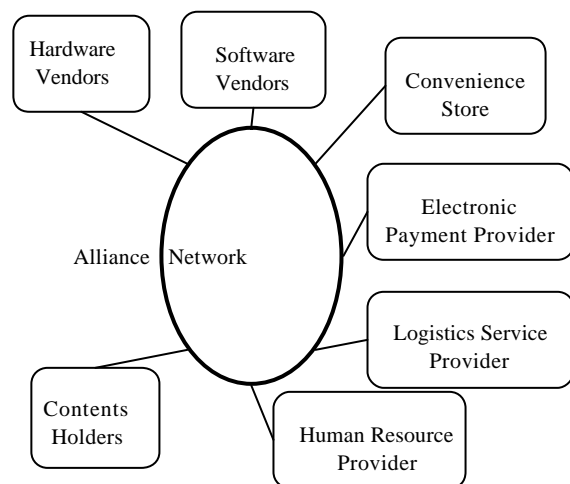

Figure 2 Alliance for Building e-Service Systems.

Understanding these changes, the e-service integrators should create business models. To prevent other company from imitating the new business model, the company should claim business model patents.

For (a), the protocol among allied companies should be defined so that transaction data should be exchanged securely. However, there are few global standards for the service connection. In general, each company has its own system, its culture, its business protocol, and so on. Therefore, there is risk for communication. Further, if a company is declared bankrupt, the business will fail. This is also risk. So a company has means to monitor allied companies status continually.

For (b), we know the price in e-service is decided not by its cost but by its value [8]. The value is defined by customers. Auction site is an example for the electronic community and flexible price. Sometimes, the price is defined by customers LTV (life time value) where LTV is evaluated by total contribution of each customer. However, it is not easy to estimate LTV. Therefore, there is also risk. To estimate LTV as correct as possible, a service integrator build customer database as shown in Figure 3.
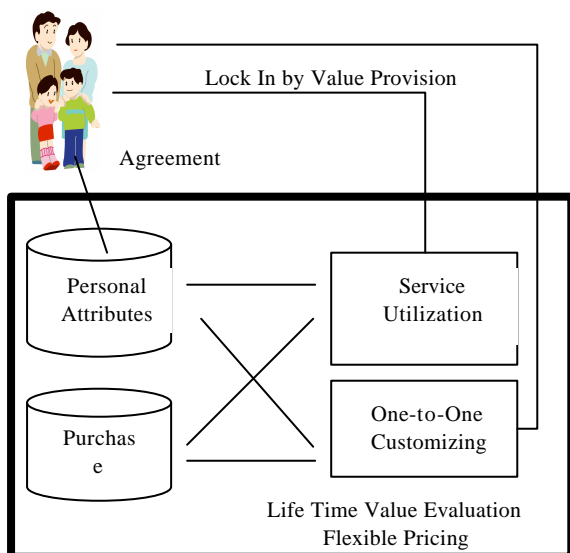

Figure 3 Personal information in e-Service.

While the customer database stores private information including name, home address, birth date, interests, favorite, purchase history, and so on, there should be privacy protection policy. If the e-service fails to handle privacy information, it will be purged out from the market. Thus, there is risk.

Therefore, the risk management including monitoring, measuring, hedging that has not been necessary for traditional system integration is indispensable for e-business integration.

4. Procedures for e-Service Integration

Based on the discussion in section 2 and section 3, let us describe our procedure for e-service integration. For building e-service, the business model establishment is the first step. There are three issues in building business model as follows:

(1) The business model is claimed for the customer satisfaction. The cost/effect analysis that is important in building traditional systems is not possible for starting the e-business. Our framework offers six types of business models: intermediator exclusion model, aggregator model, multi sales channels model, specific service model, cross-sales portal model, and communication portal model. These are discussed elsewhere [9].

(2) The target customer should be defined. Note that the interest of the aged people is different from that of the young people. Behavior of the married people is different from that of the single people. The life style and the work style should be carefully analyzed. The target customer analysis induces what kind of the user terminal is appropriate for the business.

(3) The shopping style should be defined. There are three types of shopping: for purchasing daily goods such as books and foods, customers prefer time-saving shopping. For selecting luxurious goods such as dresses, jewels, and watch, the customers would like to enjoy window shopping. They would like to check as many goods as possible even if they are busy. Finally, there is non-daily product shopping. Real estate and car are examples.

Traditionally, the products have been lined up by the company competence (the company's view). In fact, an electronic company provides a variety of electronic equipments while a chemical company provides a variety of goods from oils.

However, the menu of the e-service should be defined by the consumers' view. For example, a consumer who likes driving a car may be interested not only in car information but also in road information, car goods information, and gas station information. Thus, the contents in the e-business should be aggregated not by one company competence but by the consumers' convenience. The followings are example of the e-service vision:

(a) My company allows working women to live comfortably,

(b) Our Mission is to give a good circumstance for the aged people,

(c) We have children learn pleasantly,

(d) We hare happy if the handicapped persons enjoy the internet shopping.

To allow the consumers to handle the contents easily, contents aggregation, ASP (Application Service Provider) aggregation and account aggregation are key factors.

Then business plan should be described. The following should be defined: who are partners? How much is the possible investment? When is the deadline for recovering debts? The business plan should include the annual interest and the accumulated interest.

Currently, a guideline says that the annual interest

should be balanced in three years and the accumulated interest should be balanced in five years. We think it is a reasonable guideline. To calculating the interest, the pricing model and the number of target customer should be assumed.

Then risk/chance analysis is indispensable as shown in Figure 4. The subject in the analysis includes the risk factors of the novelty, the market acceptability, the brand, and the potential market growth. The service integrator should prepare the monitoring method and hedging method for the risks. Assigning the probability to each risk, the service integrator assumes the optimistic scenario and the permissive scenario. The scenarios should be shared among the allied companies and the project members.

Once business model is established, the service integrator should study on the feasibility from the view of the business as follows:

(1) FS (feasibility test) is promoted for verifying the scenario of the e-business. The service integrator should initiate FS as soon as possible. Then FS is executed as follows: (a) there may be limited service level, (b) the evaluation item is well defined, (c) the period for testing is clear.

The access log that shows the transaction volumes, the transaction bias, the total visitors, the unique visitors, the repeaters behavior and so on is the clue for the evaluation. The test campaign and the event promotion are useful method for measuring customer's reaction.
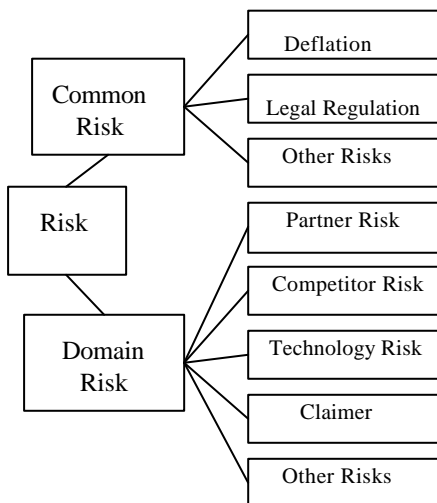

Figure 4 Tree for risk analysis.

(2) In the case that the FS gets the affirmative result for the business plan, the service integrator designs the service level in detail. The service level including the following items is designed for the business plan: (a) service contents (usability), (b) service time (availability), (c) privacy policy, (d) customer's obligation, (e) disclaimer of warranties, and (f) limitation of liability.

(3) Using two-dimension axis (free vs. charge, subscription

vs. no-subscription), the framework introduces the evolution process for the e-service. "Repeaters" and "life time value" are the keywords for evolution map. To make new visitors into frequent visitors there should be strategies that provide incentives. The value for the customers should not be evaluated in the short terms. Once an e-service site succeeds to rock in volumes of customers, there will be more chances to get new customers (profit). Figure 5 shows the evolution process for the e-service sites.

(4) Finally, the service operation policy is designed. The service level designed in step 2 shows the guideline for the computer operation and the customer support operation. The former includes security policy while the latter includes media for the customer channels. Our framework has guideline for the operation outsourcing.
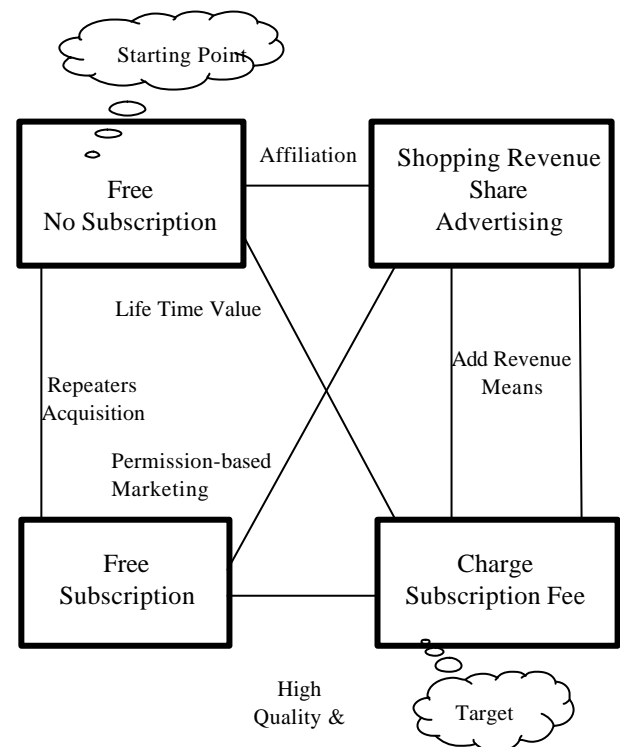

Figure 5 Evolution Transition for e-Service.

5. Office for e-Service Development

To integrate the e-service systems by the framework mentioned in the previous section, the physical place plays an important role. Analyzing the requisite of the physical place, we designed e-service creation center. Our e-service creation center that was founded in October of 2000 consists of the meeting rooms, the concept exhibition room, the presentation room and mini iDC (internet data centers). Figure 6 shows the layout of our e-service creation center.

The e-service creation center is open to persons and organizations that are interested in creating e-services. The vendors, the contents holders, the outsourcers, the carriers

and so on are the guests of the center. They exchange their competences, their vision, and their brand in order to create the business ideas at our meeting rooms.

To disclose one's competence and to make business alliances, our concept exhibition room and mini iDC are powerful. The mini iDC that is equipped with fundamental hardware, software and network is ready for starting feasibility study on business idea. The created business idea is introduced at the presentation room. The usability test is also done at the e-service creation center.

The concept exhibition room demonstrates the attraction of CDN (Contents Delivery Network) which allows persons to enjoy rich contents on internet such as streaming media. Then the contents holders who are not accustomed to CDN become to be tempted to deliver their contents via internet. Thus, there are chances for the contents aggregation.

6. Conclusion

We have described the e-service integration. We identified the difference between the traditional system integration and the e-service integration. Paying attention the difference, we develop a new framework. However, it is not easy to establish the new project management. In general, any organization has the capability maturity level for project management. To identify the level of the capability maturity is important.

CMM (Capability Maturity Model) presented by CMU [7] shows a guideline for capability maturity. There are five stages in CMM: Inconsistent Management, Project Management, Process Management, Capability Management, and Change Management.

Although in October of 2000 our capability maturity level was "Inconsistent Management" because we do not have know-how on e-service building, our current level of capability maturity is "Project Management" because we have experienced for building e-service [12][13]. For the future work, we will clarify the issues for "Process Management", "Capability Management" (Observable and Controllable), and "Change Management" for the e-service integration.

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References

[1] Boem, W.: "Software Engineering", *IEEE Transaction on Computer*, Vol. 25, No.12, pp.1226-41 (1976)

[2] Choi, S., et al., *Economics of Electronic Commerce*, Macmillan Technical Publishing (1997)

[3] Hammer, M. and J. Champy: *Reengineering the Corporation*, Harper Business (1993)

[4] Ishida, T., et al (eds.), *Digital Cities: Technologies, Experiences, and Future Perspectives*, Springer, (2000)

[5] Kataoka, M., *Software Modeling* (in Japanese), Nikka Giren (1988)

[6] Menasce, D. and V. Almeida: *Capacity Planning for Web Services*, Prentice Hall PTR (2001)

[7] SEI of Carnegie-Mellon University: *The Capability Maturity Model: Guidelines for Improving the Software Process*, Addison Wesley Longman, Inc. (1998)

[8] Shapiro, C. et al., *Information Rules: A Strategic Guide to the Network Economy*, Harvard Business School Pr Published (1998)

[9] Stoehr, T.: *Managing EBusiness Project - 99Key Success Factors*, Springer (2002)

[10] Tsuji, H., et al. "e-Transformation: Building e-Service Systems", *Proc. of The 6th World Multiconference on Systemics, Cybernetics and Informatics*, SCI'2002, pp.163-167 (2002)

[11] H. Tsuji, H. Mizuno, T. Morita, C. Hirai: "Man-Machine Cooperation in Business Risk Management", *8th IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems*, p.309-p.314 (2001)

[12] H. Tsuji, K. Fukuda, T. Yasunaga, A. Koshi: "Cafeteria-Style Benefits Plan Service System for Advanced Japanese Company", *The 4th World Multiconference on Systemics, Cybernetics and Informatics*, pp.286-290 (2000)

[13] Hiroshi Tsuji, Masato Terada, Yuki Kadowaki, Masaaki Tanizaki, Shigeru Shimada: "Spatial Information Sharing for Mobile Phones", *In Digital Cities 2*(M. Tanabe, P. van den Besselaar, T. Ishida ED.), Springer-Verlag, pp.331-342 (2002)

Concept Exhibition Room

Presentation Room

Mini iDC

Meeting Corner

Figure 6 An example layout for e-Service Creation Center.