Research on the Systems Design of E-Business

Masaru Makino *

Abstract

Nowadays recent technology for E-Business is that Web Service is most famous technology. Then the author researches "Web Service" and other concerned systems. The objective of this paper is to study recent technologies concerning systems design for web-corporation.

Recently we have global E-XX systems utilizing internet and server/client computers, such as E-Business, E-Commerce, E-Community, E-Learning, E-Government. In this paper, the author pays intense attention to E-Business, especially systems-design technology of E-Business (Web Service).

Generally we have four steps in systems design those are process of Plan-Do-Check- Action. P/D/C/A steps of this paper are as follows. First step (P): We describe systems-design that is triple technological views of application/middle/base. Second step (D): The author introduces web corporation that is composed of important software and an example of E-Business. Third step (C): The author proposes that tradeoff systems- approach between systems and security. Tradeoff means an exchange in which benefit is given up for another considered more desirable. Final step (A): We have conclusion and estimated issues.

1. General introduction for Web Service

1.1 General description of Web Service

First of all the author introduces "Web Service" and concerned technologies for E-Business. Generally the web corporations have transaction data between client and server. We have called these systems Client-Server systems.

However in Web Service we have Broker in adding Client-Server systems. The author calls this CSB (Client-Server and Broker) triangle system. This system has three technologies those are SOAP(Simple Object Access Protocol), WSDL (Web Services Description Language) and UDDI (Universal Description, Discovery and Integration).

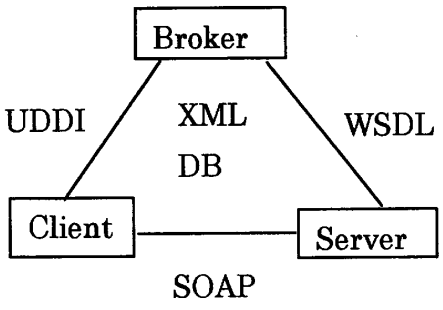


Fig. 1 Web Service

These three technologies have XML document in their each system. In this chart Broker executes important part of useful information.

* Department of Management Science

1.2 The part of Broker

Broker has information those are web-server name, address, service-content, service-price, and so on.

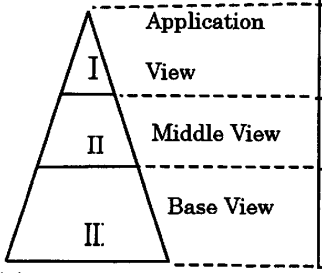
Server is web corporation that resisters its services in Broker's registry by WSDL technology. Client is customer that queries his needs of transaction and gets answers from Broker. In real society broker has many products and sells bulk of products, however in web society Broker gives bulk of information to the customer by UDDI technology.

XML executes important works for these business transaction and therefore XML is service database in Web Service.

2. Systems-Design View

As shown in Table 1, the author asserts that the systems-design of E-Business has three technological points of view as follows. (1) Application view such as Design Policy & Planning, Purchase Sys., Inventory Sys., Production Sys., Sales Sys., Receipts & Payment Sys., and Security Sys. (2) Middle view such as Web Service, XML-Database, and Security Sys.

Table 1 Systems-Design View



	Web Corporation
I	Design Planning/ Purchase Sys./ Inventory Sys./ Production Sys. / Sales Sys./ Receipts & Payment Sys./ SECURITY SYS.
II	Web Service/ XML-Database/ SECURITY SYS.
III.	Platform/ Server Operating Sys./ SECURITY SYS.

(3) Base view including the Platform of E-Business, Server Operating Sys., and Security Sys.

The author presents submission that we would be able to make concept of systems design of E-Business by using this triple views. In case of thinking systems-design, we would be able to select top-down approach (I - II - III) or bottom-up approach(III - II - I) In this approach we depend on as the case may be that application view oriented or base view oriented is selected by needs of various situations of web corporation. We design the systems not that usually from zero-based system but that often as revised-based system.

The author asserts that the most important technologies for development of information systems are "Systems Design" and keeping "SECURITY". Therefore in

table 1 SECURITY SYS is bold typed on each three views.

3. Significant Software in Web Corporation

As shown in table 1, there are triple systems-design views in web corporation. The author says that web corporation isn't equal to real company. One of the greatest difference between web corporation and real company is that web corporation does not necessarily compose from single company but also often is composed from plural and complex companies. Each view has various sort of software-packages related with E-Business. To take a few examples, view I has CRM (Customer Relationship Management), ERP (Enterprise Resource Planning), SCM (Supply Chain Management), and DWH(Data Warehouse). View II has Web Service software those are SOAP (Simple Object Access Protocol), WSDL (Web Service Description Language), UDDI (Universal Description Discovery Integration), XML-Database, and SQL Database. View III has server OS, and server-side important software.

As for security systems in three views, we have much security software such as Firewall-soft, PKI-soft, VPN-soft, Cipher-soft, Busting Virus-soft, Digital Money soft, and so on. We use these software as for encrypting business-document, digital certificates, detecting privacy, tracing hacking-route, seeking business-scam, access control and restriction, securing electronic money, packet filtering, discovering spoof etc.

4. An example of E-Business

E-Business has business-transaction data from business companies to business companies thorough internet communication.

4.1 Security System in Payment Activity

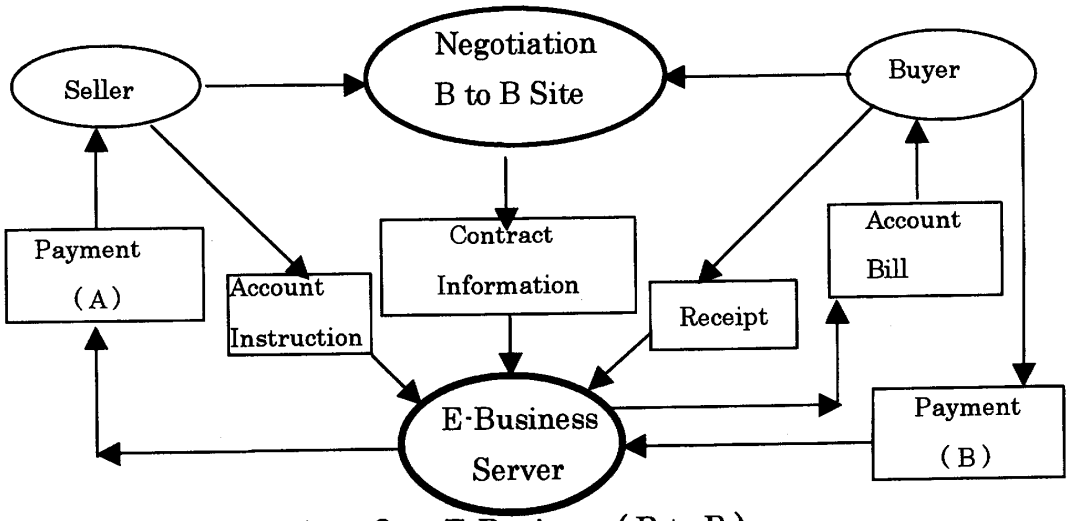


Fig. 2 E-Business (B to B)

As shown in Fig.2, E-Business server-computer supervises business transaction-data with seller and buyer. Real seller and buyer in this system generally do not meet face to face mutually. The company or enterprise is often virtual, therefore security information for seller and buyer is exceedingly important in these systems.

Especially payment(B) and receipt are most important in Fig2. We must be exceedingly careful in selecting any sort of electronic and digital moneys those are E-credit, E-check, E-transfer, and any E-money (IC-card, Cyber cash, etc.). These electronic and digital money are recently called high-tech money which involves cellular phone & electronic wallet and other mobile & ubiquitous unit.

We utilize certification system for the purpose of certifying seller and buyer whether he is real being or false being. False being is called as spoof. It is not easy to perceive the truth in business transaction. However we must approach nearly risky situation for the purpose of getting profit. Generally we often hear that business management is challenge to the risk. Risk on the business activity often occurs as the criminal act of money trouble.

Therefore the author suggests that we should prepare the payment systems as much as various sorts of cases. Then we must select the payment system according to the significance of business relationship. Moreover the author says that E-Business has relationship with E-Banks (Finance), E-Commerce (General, Auction, Mail order Sys.), E-Government (Certification Sys.), E-Insurance, E-Community, and so on.

4.2 Dynamic and fresh Contents in E-Business systems

The contents of business-transaction site are most important for the success of business negotiations in E-Business system. Popularity of contents in web-site depends on break-through of technology. Technological popularity in present time is as follows. The author says that contents will be realized by combination of these technologies.

(a) XML-Database
(b) Video-Streaming
(c) IP-Multicast
(d) Web-3DCG
(e) Interactive Communication
(f) Mobile & Ubiquitous Computing

Java program, XML-multimedia source data and special program concerned with technologies ((a) ~ (f)) will be able to make dynamic contents of E-Business systems.

The author asserts that recent rapid change of internet application will be changeable more and more. The author calls these situation Systems Revolution of IT.

4.3 The age of XML revolution in E-Business systems

The author asserts that we should meet the age of XML revolution in E-Business which is the next generation E-Business as follows.

(1) E-Business systems would change in its style by XML systems.

(2) E-Business systems would separate from one system to two or more subsystems.

(3) E-Business systems would consist of inner system, middle system and outer system those are backend system, middle system and front-stage system.

(4) E-Business systems would have connectivity between web-site and transaction systems those have continuity from portal site to transaction processing systems

(5) The general aspect of XML revolution has new generation workflow systems in the next generation IT society.

5. Tradeoff Approach in Systems Design of E-Business

In this section the author presents "Tradeoff Approach" that is tradeoff operation between systems design and security design.

5.1 Conceptual consideration of Tradeoff Approach

The author guesses that you know relationship between prices and employment in the economical society. If prices would be going up, then employment opportunities have more and more expanded. This relationship is approved in opposite situation. That is to say, if prices would be falling then employment opportunities have less and less become narrow, and as a logical consequence unemployment increases more and more. This relationship is defined as that A and B are in the tradeoff-relationship with each other.

In systems design, we expect much profit that is brought by the result of object-activity which is business transaction or systems model. However profit doesn't come true without security systems.

In this paper, the author suggests the next hypothetical formula in systems design.

$$\text{Profitability} = \text{Feasibility} - \text{Security}$$

Feasibility is expecting result of object-activity in systems design. Object-activity is brought from each system/subsystem in each layer of the table 1 which is exclusive of security systems. That is to say, feasibility is active technology on the other hand security is passive technology.

The author says that we would be able to see tradeoff-relationship between active technology and passive technology. So if we might reject passive technology then we could not realize expecting better result of active technology.

In this paper, the author asserts that we would be able to estimate necessary valuation of each system/subsystem by utilizing tradeoff-relationship as shown in the table2.

Information-systems security is in connection with C/I/A-A/A/R in the table 2. C/I/A-A/A/R are regulated in JIS X 5080, ISO/IEC 17799, BS 7799, ISO/IEC 15408. In this paper, the author would like to discuss relationship between C/I/A-A/A/R and tradeoff-valuation. Then we should be aware of the fact that the Table 2 is in connection with each layer of the Table 1.

Table 2 Tradeoff Approach

Sys / Security	Sys/Sub A	Sys/Sub B	Sys/Sub C		Valuation
C/I/A	a m	b n	c o		＊1、＊3
A/A/R					＊2
Others					＊4
P					＊2

＊1 : C/I/A is regulated as Security Policy.
C (Confidentiality),I(Integrity),A(Availability)

＊2 : A/A/R is regulated as Security Design.
A(Accountability),A(Authenticity),R(Reliability),P(Profitability)

＊3 : Estimated numerical value (earnings and costs) is written in each box.
a,b,c,~ = Earning (in Feasibility), m,n,o,~ = Loss (in Security)
Each row has similar meaning in each box.

＊4 : Tradeoff Approach / Masaru Makino, All rights reserved.

5.2 Systems Approach of Tradeoff

For the purpose of filling Table 2 by value of sys/sub and cost of development for security system, the author asserts that we must have forward approach as follows.

We have 4 steps of these procedures as shown in Fig 2.

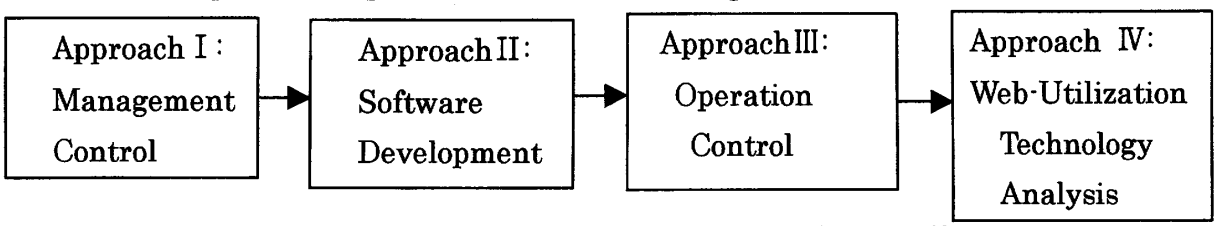


Fig. 2 Systems Approach of Tradeoff

Approach I : This is the approach concerned with management control. This procedure has sub-procedures, those are sales profit, sales amount, shared cost, cost of

advertisement, and so on.

Approach II : This is the approach of software development. This procedure has sub-procedures, those are the cost of web application software, security concerned software, and so on.

ApproachIII : This is the approach of system operation control. This procedure has sub-procedures, those are outsourcing cost, organization measures cost, security measures cost, and so on.

Approach IV : This is the approach of web concerned technology analysis. This procedure has sub-procedures, those are portal site analysis, top-page hit number, search engine analysis, access log analysis (key-word and access person analysis), web-site analysis (link situation, site design etc.).

The author asserts that we must use these approach(I ~IV) for feasibility estimation of system/subsystems, and for security estimation of C/I/A or A/A/R in the Table 2. And moreover we must estimate other items for profit and loss situation.

We should always be aware of balancing for management and technologies those are great importance of tradeoff approach.

6. Conclusion

In this paper the author asserts the following conclusion on the technology for systems-design of E-Business. (1) Triple systems-design view : We have triple view for systems design of E-Business as shown in Table 1 those are Application, Middle, Base. (2) Web corporation software : We have important software in virtual enterprise on each of the triple layer. (3) An instance of E-Business : The author gives typical model those are security system in payment activity and dynamic & fresh contents in E-Business system. (4) Tradeoff Approach : The author presents original Tradeoff Approach in systems design of E-Business by using the Table 1, Table 2 and the approach(Apr. I ~ IV).

7. Estimated Issues

In this paper, the author has issues that we should take measures to meet the new situation in the short distant future. Information-systems and computer-environment change year by year. Computer and network technology makes progress with tremendous speed. Therefore the author should always have preparation for the next step. For example of issues are (1) Connection and Balancing between E-Business and E-Government especially digital certificates or detecting privacy, (2) Social Security for Business scam, (3) Revolution on Web corporation, and so on.

References

(1) Masaru Makino, " Security Systems Design for MIS/OA related with Computer Network ", Proceedings of 2000 MIS/OA International Conference, KMIS(Korea MIS Society), June 2000, pp.205-208.

(2) Yuusei Ishida, Masaru Makino, " Study on Cyber Information Security ", Memories of Fukui University of Technology (No.32), March 2002, pp.327-334.

(3) Masaru Makino, " Research for the SECURITY systems-design of information application-systems", Memories of Fukui University of Technology (No.31), March 2001, pp.313-319.

(4) Japan IBM Corp., " Developers guide of WebSphere-Application Server ", Pierson Education Corp., May 2001.

(5) Japan IBM Corp., "Approaches to the Next Generation of e-business", ProVISION (No.32), Winter 2002.

(6) IEEE Computer society, " Computer (September 2002) ", IEEE, September 2002.

(7) IEEE Computer society, " Computer (August 2002) ", IEEE, August 2002.

(8) IPSJ, "Revolution of Network Technologies to Support the Ubiquitous Computing Environment ", IPSJ Information Processing Magazine, Vol.43 No.6, June 2002.

(9) IPSJ, "Multi-Cast Technology", IPSJ Information Processing Magazine, Vol.42 No.8, August 2001.

(10) Kureha Odera, Others, "Intelligible ISMS (Information Security Mgt. Sys.)", NikkeiBP, August 2002.

(11) Bill Brogden, " Perfect guide of SOAP Programming by Java (Japanese Edition)", Technologies Criticism Corporation, November 2002.

(12) Web site concerned with IT (Information Technology): www.xmlconsortium.org/, www.unisys.co.jp, www.honda.co.jp/ACCESS/, www.sony.co.jp/index.html, www.verisign.co.jp, www.isms.jipdec.or.jp/, www.microsoft.com/japan/msdn, www.ibm/jp/services/ www.ebiz-ex.com/

(Received December 8, 2003)