



# ALIGNING TECHNOLOGY WITH BUSINESS AN ANALYSIS OF THE IMPACT OF SOA ON OUTSOURCING

**BENAZEER Md. Shahzada; VERELST Jan; GREMBERGEN Van Wim; MANNAERT Herwig**  
DEPARTMENT OF MANAGEMENT INFORMATION SYSTEMS  
UNIVERSITY OF ANTWERP, BELGIUM.

E-mail: [shahzada.benazeer@ua.ac.be](mailto:shahzada.benazeer@ua.ac.be), [Jan.verelst@ua.ac.be](mailto:Jan.verelst@ua.ac.be), [wim.vangrembergen@ua.ac.be](mailto:wim.vangrembergen@ua.ac.be)  
[herwig.mannaert@ua.ac.be](mailto:herwig.mannaert@ua.ac.be)

## ABSTRACT

Business related IS / IT innovation is changing very rapidly. There are so many new technologies introduced by the academic and practitioner community that the business community is very puzzled and it is very difficult for them to decide, which one to accept and which one to reject. We think that SOA architectural design has all the characteristics which the business community desires for long. We also think that SOA is a solution which can align the technology with business objectives. Adopting SOA, can bring uniformity in IS / IT department which can also lead to enhanced outsourcing.

**Keywords:** *Service-Oriented Architecture, Web-Service, Outsourcing, Core Competency, Standardisation of IS / IT resources, Flexibility and Agility.*

## INTRODUCTION

The purpose of any new technological innovation is to facilitate the working habits of mankind. In business, technology is always used to enhance the performance and to sustain a competitive advantage. To achieve this goal, academic and practitioner community are working tirelessly to introduce a better and more efficient system to business community. Service Oriented Architecture (SOA) is a result of this effort. The paper is structured as follows. We define SOA and highlight the benefits derive from it.

We introduce IS outsourcing with a table of different definitions and at the end we try to prove that SOA has a positive impact on outsourcing.

### 1. INTRODUCING SOA

SOA is a set of design principles for building software systems. SOA adopts a service-centric approach that is significantly different from previous application-centric architectures. At its core, SOA is about factoring functionality into shared, reusable services, and applications

are built by assembling those services into automated business processes.

SOA can be defined as “an architectural style promoting the concept of business-aligned enterprise services as the fundamental unit of designing, building, and composing enterprise business solutions. Multiple patterns, defining design, implementations, and deployment of the SOA solutions, complete this style” (Lublinsky, B., 2007) [19]. In his research paper Huysmans, P., [12], compiled the definition of SOA, in very details and divided it in two categories: definitions in technical level and definitions in business level.

#### 1.1 SOA and Web Services

Many people associate SOA with web services, but this tight association isn't appropriate. SOA is an architectural style governed by a set of design principles. The Web Service is a type of standards-based middleware for implementing services. It is a technology that facilitates the development of service-oriented systems, but using it doesn't guarantee a successful SOA initiative. Developers can easily develop tightly coupled, monolithic applications



using the Web Service even if they don't follow SOA design principles.

## 1.2 Benefits of SOA

Service-oriented architecture (SOA) is a design style that enables businesses to increase flexibility and agility. But in order to achieve these advantages, an organization must embrace SOA as a lifestyle change. SOA is a new way to design systems, and this technology shows a new direction to its user's to think differently about business process. SOA requires a different mindset, and it requires discipline. To improve the chances for success, an organization must establish discipline through a strong governance program. In addition to increasing flexibility and agility, SOA can enable the following benefits:

- **Reduced costs**

Most SOA benefits are the soft kind, which are hard to measure, but a number of organizations have been able to demonstrate significant cost savings through reuse. Merrill Lynch claims to have saved as much as \$42 million since 2001[20]. Another Fortune 50 financial conglomerate anticipates saving hundreds of millions of dollars per year by re-factoring complex yet generic infrastructure functionality, such as auditing, security, and management, into shared services [1].

- **Reduced redundancy**

One of the primary goals of SOA is to implement functionality once and reuse it in all applications that need it. A SOA initiative can help an organization identify redundant functionality and decommission duplicate applications.

- **Better consistency, security, and compliance**

If a business rule is implemented in a service, then all applications that use the service will apply the business rule in a consistent manner. This benefit can be especially useful

when implementing highly consequential rules, such as those related to security and legal regulations.

- **Improved productivity, efficiency, effectiveness, and satisfaction**

SOA enables access to whatever data or functionality an application requires; therefore, service-oriented applications should support business processes more effectively, and likewise, service-oriented applications should improve the user experience. For internal applications, a better user experience will make employees more productive and efficient. For external applications, a better user experience will improve customer satisfaction.

## 2. OUTSOURCING

The emphasis of this paper is on *Information Systems* outsourcing. The generic notion of 'outsourcing' – making arrangements with an external entity for the provision of goods or services to supplement or replace internal efforts – has been around for centuries. There is a large body of research that examines outsourcing business functions such as logistics, payroll, human resources, and so forth. However, IS outsourcing is fundamentally different from other forms of outsourcing. IS is pervasive throughout the organization. It is not a homogenous function, but rather is interrelated with practically all organizational activities [24]. Therefore it is better to concentrate solely on research that directly addresses IS outsourcing, not withstanding the valid and worthwhile body of research concerned with outsourcing other business functions.

### 2.1 Introducing IS Outsourcing

The term "outsourcing", although is not specific to IS. It reflects the use of external agents to perform one or more organizational activities (e.g., purchasing of a good or service), is now widely used in the IS domain and applies to everything from use of contract programmers to third party facilities management.



**Table 1. IS Outsourcing has variously been defined in the IS literature as follows:**

Loh & Venkatram 1992a, p- 9, [18]	"...the significant contribution by external vendors in the physical and/or human resources associated with the entire or specific components of the IT infrastructure in the user organization"
Lacity & Hirschheim 1993b, p-74, [16]	"...the purchase of a good or service that was previously provided internally"
Fitzgerald & Willcocks 1994, p-92, [9]	"... the commissioning of a third party (or a number of third parties) to manage a client organization's IT assets, people and/or activities (or part thereof) to required results"
Chaudhury et al. 1995, p-132, [6]	"...the contracting of various information systems' sub-functions by user firms to outside information systems vendors"
Cheon et al. 1995, p-209, [7]	"...the organizational decision to turn over part or all of an organization's IS functions to external service provider(s) in order for an organization to be able to achieve its goals"
Apte et al. 1997, p-289, [4]	"...turning over to a vendor some or all of the IS functions..."
Hu et al. 1997, p-288, [11]	"...business practice in which a company contracts all or part of its information systems operations to one or more outside information service suppliers"
Kern 1997, p-37, [14]	"... a decision taken by an organization to contract-out or sell the organization's IT assets, people, and/or activities to a third party vendor, who in exchange provides and manages assets and services for monetary returns over an agreed time period"
Willcocks & Kern 1998, p-2, [26]	"...the handing over to a third party management of IT / IS assets, resources, and / or activities for required results"
Hancox & Hackney 1999, p-1, [10]	"...the third party provision of IT products and services"

## 2.2 Short History

Outsourcing of information systems began to evolve in 1963 when Ross Perot and his company Electronic Data Systems (EDS) signed an agreement with Blue Cross of Pennsylvania for the handling of its data processing services. This was the first time a large business had turned over its entire data processing department to a third party [23]. Such an arrangement was

different from other 'facilities management' contracts that EDS had entered into because in the Blue Cross case, EDS took over the responsibility for Blue Cross's IS people. When Eastman Kodak announced that it was outsourcing its information systems (IS) function in 1989 to IBM, it created quite a stir in the information technology industry. Never before had such a well-known organization, where IS was considered to be a strategic asset, turned it over to third party

providers [2]. Since then both large and small companies have found it acceptable, to transfer their IS assets, leases and staff to outsourcing vendors [3]. Kodak appears to have legitimized outsourcing, leading to what some have called “*the Kodak effect*” [5].

### 2.3 Core competency model

The main ideas about Core Competencies were developed by *C. K. Prahalad and G. Hamel (1990)* through a series of articles in the “*Harvard Business Review*” followed by a best-selling book “*Competing for the Future.*” Core competencies are those capabilities that are critical to a business achieving competitive advantage. Companies outsource IS for many reasons [25], industry watchers generally attribute the growth of the IS outsourcing market to two primary phenomena [17].

*First*, interest in IS outsourcing is largely a consequence of a shift in business strategy. Many companies have recently abandoned their diversification strategies – once pursued to mediate risk – to focus on core competencies. Senior executives have come to believe that the most important sustainable competitive advantage is strategic focus by concentrating on what an organization does better than anyone else while outsourcing the rest. As a result of this focus strategy, IS came under scrutiny. Senior executives frequently view the entire IS function as a non-core activity, and believe that IT vendors possess economies of scale and technical expertise to provide IS services more efficiently than internal IS departments.

*Second*, the growth in outsourcing is a function of the unclear value delivered by IS. In many companies, senior executives view IS as an overhead, an essential cost but one to be minimized nevertheless. These two phenomena, refocus to core competencies and the perception of IS as a cost burden. IS outsourcing entails an enterprise using a third party to provide a service. IS outsourcing gained popularity over the years mainly as a cost reduction policy. Most senior executives believe that it is cheaper to utilize a third-party’s resources than your own.

### 3. IMPACTS OF SOA ON OUTSOURCING

Success of SOA is inviting new debates about the changes in business practices. Many professionals, experts and academics have started to argue about the impact of SOA on IS outsourcing. More recently, the industry has seen the growth of new areas of IS outsourcing – web and e-Business outsourcing where vendors are contracted to provide web-based applications to enable a firm to enter the e-Business era [15]. Over the years, outsourcing has evolved from the one vendor vs. one client arrangement to more complex models involving multiple vendors and multiple clients. SOA is very ideal architectural design to face this kind of complex challenges.

#### PROCESS FLOW “A-B-C-D-E” OF THE SERVICE CONSUMER

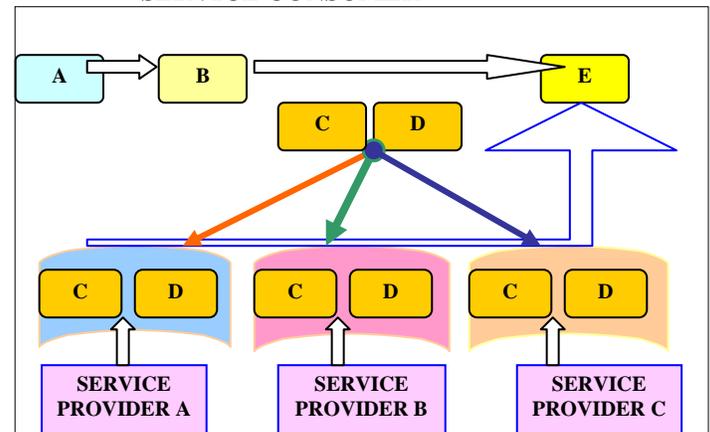


Fig.1. Business Process Outsourcing in SOA architecture.

Analysis on the literatures based on the comments made by the academics and the practitioner mentioned below.

#### 3.1 Thomas H. Davenport [8] *Harvard Business Review 2005*

“*Since information systems support processes, standardization allows uniform information systems within companies as well as standard systems interfaces among different firms. Standard processes also allow easier outsourcing of process capabilities.*”

if we agree that SOA is an IS standardisation of business process which is going to be established and adopted by most of



the organisations in near future then it is logical to hypothesise that, this new IS standard of business process is going to enhance outsourcing. Widespread SOA adaptation and its success in many companies, is a proof that SOA is going to become an IS standard for organizations. Then we can proof that how IS standardization of business process can enhance outsourcing. The author further continues to explain how the outsourcing will dramatically increase due to standardisation of business process, mentioned below:

*“The lack of standards may also explain why, in the few broad studies of satisfaction with outsourcing, many companies - up to half in some studies-are dissatisfied with their outsourcing relationships. However, a new world is coming, and it will lead to dramatic changes in the shape and structure of corporations. A broad set of process standards will soon make it easy to determine whether a business capability can be improved by outsourcing it. Such standards will also make it easier to compare service providers and evaluate the costs versus the benefits of outsourcing. Eventually these costs and benefits will be so visible to buyers that outsourced processes will become a commodity, and prices will fall dramatically. The low costs and low risk of outsourcing accelerate the flow of jobs offshore, force companies to look differently at their strategies, and change the basis of competition. These changes are already happening in some process domains, and there are many indications that they will spread across virtually all commonly performed processes.”*

We already know that how process standards such as SAP, SCOR, CMM, eTQM and PROMIS have succeeded. There is no doubt that Information system can't afford to continue to use systems which are custom-built to support local and idiosyncratic process. SOA is an opportunity for the software architects to get involved in standard setting initiatives at an early stage.

**3.2 Jan vom Brocke & Malik A. Lindner  
European Research Center for  
Information Systems (ERCIS)  
Universität Münster [13]**

*“Problems from outsourcing can partially be avoided by Information System that is based on SOA. Due to the use of accepted standards, the technical dependence can be reduced, and by keeping the control of the*

*process, the essential competences are kept in the company. The most benefit, however, might arise from the great variety of partners a company can choose for each specific service. As part-processes are sourced out, enterprises do not depend on few partners. On the contrary, they can build a portfolio out of several different service providers that fit for their contemporary demands.”*

- **“All or Nothing” Decision**

From the above comments, it is clear that how an organisation can re-position their business process practices and how an organisation can find itself in an advantageous position by adopting SOA. Due to the agility and flexibility characteristics of SOA, an organisation can get rid of tough decision making process of outsourcing from “all or nothing” decision to the simple assignment of part processes to specialized providers.

- **Cost Reduction and Improved Quality**

From the above comments, we can conclude that, while SOA can provide an organisation flexibility of choosing from the great variety of service providers, it will definitely increase competition among providers which can result reduced cost of outsourcing and improved quality of service. Ultimately, this trend will encourage the top executives to outsource more and more.

- **SOA Reduce the Risk of Outsourcing**

Many companies avoid outsourcing, because giving out entire process to service provider can be harmful for the companies to enjoy strategic advantage. But by adopting SOA, companies can have an opportunity to outsource sub-processes or a task. Outsourcing sub-processes or task can reduce the risk of losing strategic advantages. This can result in increased confidence in outsourcing decisions. This view is supported by the author's remarks mentioned below.

*“Yet, the realisation of outsourcing also comes along with serious problems that have been increasingly pointed out in research by now. Apart from problems concerning data protection, security, and controlling, also the danger of being dependent on the partners providing the outsourced work are reported. Service-oriented architectures of information systems seem to offer solutions for these problems.”*



- **Core Competency, SOA and Outsourcing**

*“On today’s markets, enterprises are increasingly forced to act efficiently and flexibly. To do so, there is a distinct trend for enterprises nowadays to concentrate in their business on core competences and strategic competitive advantages. Doing so, information systems play an important role as they enable new ways for doing business. A rather promising approach is to link companies together in networks by inter-organisational systems in a way that each company concentrates on a special field. For the single company, this means to source out fields of work by engaging another company to do the work.”*

From the above comments we can understand that how core competency, SOA and enhanced outsourcing are inter-linked. Service Oriented Architecture is also called by some professionals, experts and academics as Internet Based Architecture. One of the advantages of this architecture is that it will link companies together in networks. This will enhance virtual communication between organisations and it will help companies to decide what to keep in-house and what to outsource. Another advantage of this inter-organisational link is a service provider can take virtual and dynamic control of a process or part of a process which can be virtually monitored by the service consumer. If we read the remarks mentioned below by the authors, it become more convincing that core competency, SOA and outsourcing are tightly inter-linked.

*“SOA gives the opportunity to concentrate on the core competences of a company without sourcing out complete fields of work, but by tasking out even specific sub-processes. Doing so, it might be possible to use advantages of outsourcing by keeping the control over the entire process.”*

**3.3 Paul Grefen & Samuel Angelov [21]  
Eindhoven University of Technology  
Heiko Ludwig & Asit Dan  
Watson Research Center, IBM.**

- **Business Efficiency, Outsourcing and SOA**

*“Outsourcing of business processes is crucial for organizations to be effective, efficient and flexible. In fast changing markets, dynamic outsourcing is required, in which business relationships are established and enacted on-the-fly in an adaptive, fine-grained way. This requires automated means for the establishment of outsourcing relationships and for the enactment of services performed in these relationships. Due to wide industry support and their model of loose coupling, Web Services have become the mechanism of choice to interconnect organizations.”*

As we have mentioned above that the web service is “a technology that facilitates the development of service-oriented systems”. If an organisation wants to adopt SOA, it has to go through the process of web service. In the above remarks by the authors we can understand how inter-dependent is the business efficiency, outsourcing and SOA (web service) on each other. If an organisation wants to be efficient, it has to think about outsourcing and for an effective and dynamic outsourcing, organisation needs the help of technology, i.e. SOA or web service.

- **SOA means agility, flexibility and fast adaptation to change**

In 21<sup>st</sup> century, business became highly competitive and the market is very volatile. Organisations should adopt technologies which can neutralise the effect of unstable market and can absorb the undesirable shocks. SOA architecture is capable to support organisations in uncertain atmosphere.

The authors, also suggests this in their remarks mentioned below.

*“In modern e-business settings, however, organizations have to shift their priority to flexibility and ability to change if they want to survive. Players in a market and competitive situations change fast. Adaptation to change is crucial, not only in the internal organization of a business entity, but also in the choice of collaboration partners. In this context, we see the emergence of dynamic virtual markets (or dynamic digital markets) in which partners are selected for short to medium timescale collaboration.”*



*“Consequently, a highly dynamic approach is required to service outsourcing to create or retain a competitive position for a commercial organization. This means that in business process outsourcing, service consumers dynamically determine which service providers to use in the enactment of their business processes. We call this dynamic business process outsourcing. This paradigm implies dynamic selection, contracting, coupling and executing of business services.”*

In above remarks, authors explained about the current business environment, where agility, flexibility and adaptation to change is very crucial. Due to the adaptation of SOA, service consumer will have now opportunity to select a service provider and if necessary to change this service provider with out any pain. This is a proof that the obstacles in outsourcing decision is reducing due to SOA adaptation.

#### 3.4 Ron Schmelzer [22]

*Co-author of “Service-Orient or Be Doomed” (Wiley 2006).*

*Lead author of XML and Web Services Unleashed (SAMS 2002)*

*Founder of ‘ZAP Think’*

*“SOA helps companies outsource, because SOA provides an abstraction layer on top of existing technology resources, allowing third parties to provide those resources more easily, with business users ideally being none the wiser.”*

From the above remarks, it is very clear that the author has high confidence on positive impacts of SOA to outsourcing.

- **Industrialised model of IS / IT**

Apart from technological aspects of adopting SOA, the author used another lens to proof how SOA can enhance outsourcing. This new lens is industrialisation of IS / IT resources. We all know that manufacturing sector is much more organised and cost effective than the service sector. The manufacturing sector is ahead of service sector because, in manufacturing sector almost in every industry, the process is standardised. This standardised process is key tool to mass production resulting minimised cost and improved efficiency. This also gives a lot of flexibility to service provider and to service consumer. We need to think and analyse the comments of the author mentioned below.

*“SOA and outsourcing are actually both key aspects of the movement of IT towards an industrialized model.”*

So, this is not wrong to say that to make business process cost effective and efficient we need a fine tuning of our present IS / IT resources. If we can industrialise the IS / IT resources than we can see that SOA and outsourcing are two sides of the same coin. The comments of the author below further strengthen this view.

*“SOA provides the technological underpinnings to make the IT industrialization a possibility; it’s the economic movement to outsourcing that makes IT industrialization a reality.”*

*“It’s becoming clear that the economic value that companies seek from outsourcing closely matches, and reinforces, the economic benefits they see from implementing SOA.”*

*“The convergence of the outsourcing and SOA movements illustrate that IT is becoming industrialized as well. In many ways, SOA represents the technology required to “mass produce” highly reusable IT components. Outsourcing reflects the increased desire of companies to stop custom producing their own IT components. In this regard, SOA and outsourcing really are two aspects of the same macroeconomic trend towards the industrialization of IT.”*

#### 4. FUTURE RESEARCH DIRECTIONS

Much has been written about outsourcing its successes and about its failures. Different author’s used different methods and parameters to focus on success and failure. There is a lack of uniformity in measurement success and failure of outsourcing. In some cases, over expectation is also a cause which inflates the rate of failure.

There are very few academic research literature has been written linking SOA and outsourcing. We think, the scientific community should start to look in depth how these two factors could influence the organisational structure and the business strategy in future.



## 5. CONCLUSION

Above discussion is a reflection of our search to link SOA with outsourcing. We also took help from different scientific literatures to proof that SOA has some impacts on outsourcing. We found very few scientific literatures which links SOA directly with outsourcing. But there are some scientific literatures where "SOA" word is not directly mentioned, instead web service, internet based architecture or flexible architecture has been used.

The article of T.H. Davenport and Ron Schmelzer has many similarities. T.H. Davenport stressed on the IS / IT standardisation of Business Process which can lead to enhanced outsourcing. On the other hand Ron Schmelzer stressed on industrialisation of IS / IT resources which also can lead to enhanced outsourcing. Although it seems that the both articles are showing same direction but the visible difference is that Ron Schmelzer has used the word SOA many times but T.H. Davenport has not used it.

Companies are investing billions of dollars in developing and deploying SOA but it is unfortunate that very little empirical research has been done to analyse the impact of SOA on business strategy. Most of the large companies outsource entire or a part of their business process and this trend is increasing. These large companies are also in forefront to adopt or to deploy SOA in their organisation. So, it is important to study how adopting SOA can have direct or indirect impact on their business practices.

This study has contributed in linking and highlighting two important factors in business strategy. We advocate that SOA and outsourcing has to accommodate together in organisation and adopting SOA will have a positive impact on outsourcing. Through this article, we like to invite the research community to start the debate on this important issue.

## REFERENCES

- [1] Anne Thomas Manes, vice president and research director, Burton Group, "Service-Oriented Architecture: Developing the Enterprise Roadmap. Version: 2.0, Jul 13, 2006.
- [2] Applegate, L. and Montealegre, R. (1991). "Eastman Kodak Organization: Managing Information Systems Through Strategic Alliances," Harvard Business School Case 9-192-030, Boston, Massachusetts.
- [3] Arnett, K. P. and Jones, M. C. (1994). "Firms that Choose Outsourcing: A Profile," *Information & Management*, Vol. 26, pp. 179-188.
- [4] Apte, et al. (1997). "IS Outsourcing Practices in the USA, Japan and Finland: A Comparative Study," *Journal of Information Technology*, Vol. 12, pp. 289-304.
- [5] Caldwell, B. (1994). "Special Counsel – Outsourcing lawyers can help corporate clients avoid nasty pitfalls when signing billion-dollar deals," *InformationWeek*, Vol.499, No. October 31.
- [6] Chaudhury, et al.(1995). "Management of Information Systems Outsourcing: A Bidding Perspective," *Journal of Management Information Systems*, Vol. 12, No. 2, pp. 131-159.
- [7] Cheon, et al. (1995). "Theoretical Perspectives on the Outsourcing of Information Systems," *Journal of Information Technology*, Vol. 10, pp. 209-210.
- [8] Davenport T.H., 2005. The coming commoditization of processes. *Harvard Business Review*, 83(6), 100–108.
- [9] Fitzgerald, G. and Willcocks, L. P. (1994). "Contracts and Partnerships in the Outsourcing of IT," *Proceedings of the 15th International Conference on Information Systems*, Vancouver, Canada, pp. 91-98.
- [10] Hancox, M. and Hackney, R. (1999). "Information Technology Outsourcing: Conceptualizing Practice in the Public and Private Sector," *Proceedings of the 32nd Annual Hawaii International Conference on System Sciences*.
- [11] Hu, Q., Saunders, C. and Gebelt, M. (1997). "Research Report: Diffusion of Information Systems Outsourcing: A Reevaluation of



- Influence Sources," Information Systems Research, Vol. 8, No. 3, pp. 288-301. [http://www.baselinemag.com/print\\_article2/0,1217,a=171225,00.asp](http://www.baselinemag.com/print_article2/0,1217,a=171225,00.asp)
- [12] Huysmans, Philip. "Towards Systematic Identification of Services: A Domain-Specific Approach"- In: Proceedings of 2<sup>nd</sup> International Conference on Software and Data Technologies (2007), July 22, 2007, Barcelona, Spain, s.l., INSTICC Press, 2007.
- [13] Jan vom Brocke & Malik A. Lindner Service Portfolio Measurement — A Framework for Evaluating the Financial Consequences of Out-tasking Decisions, ICSOC'04, November 15–19, 2004, New York, New York, USA.
- [14] Kern, T. (1997). "The Gestalt of an Information Technology Outsourcing Relationship: an Exploratory Analysis," Proceedings of the 18<sup>th</sup> International Conference on Information Systems, Atlanta, Georgia.
- [15] Kern, T., Lacity, M. and Willcocks, L. (2001). Application Service Provision, Englewood Cliffs: Prentice Hall.
- [16] Lacity, M. C. and Hirschheim, R. A. (1993b). Information Systems Outsourcing : Myths, Metaphors, and Realities, Chichester, New York: Wiley.
- [17] Lacity, M. C. and Willcocks, L. P. (2001). Global Information Technology Outsourcing: In Search of Business Advantage, Chichester: Wiley
- [18] Loh, L. and Venkatraman, N. (1992a). "Determinants of Information Technology Outsourcing: A Cross Sectional Analysis," Journal of Management Information Systems, Vol. 9, No. 1, pp. 7-24.
- [19] Lublinsky, B. (2007). Defining soa as an architectural style. on-line available at <http://www-128.ibm.com/developerworks/library/ar-soastyle/index.html>.
- [20] Mel Duvall. "Merrill Lynch & Co.: Web Services, Millions of Transactions; All Good." BaselineMag.com. 7 Feb 2006.
- [21] P. Grefen et al. Information and Software Technology 48 (2006) 1115–1134, 14 June 2006, Elsevier B.V.
- [22] Ron Schmelzer, Document ID: ZAPFLASH-10132004, Document Type: ZapFlash, Posted: Oct. 13, 2004
- [23] Rudy Hirschheim et al. The DATA BASE for Advances in Information Systems - Fall 2004 (Vol. 35, No. 4)
- [24] Willcocks, et al.(1996). "To Outsource IT Or Not? Recent Research on Economics and Evaluation Practice," European Journal of Information Systems, Vol. 5, No. 3, pp.143-160
- [25] Willcocks, L. and Fitzgerald, G. (1994). A Business Guide to Outsourcing Information Technology, London: Business Intelligence.
- [26] Willcocks, L. P. and Kern, T. (1998). "IT Outsourcing as Strategic Partnering: The Case of the UK Inland Revenue," European Journal of Information Systems, Vol. 7, No.1, pp.29-45.