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Business Drivers for Application Servicing and a Software-as-a-Service Model

Jiri Vorisek

University of Economics Prague, W. Churchill Sq. 4, 130 67 Prague, Czech Republic
vorisek@vse.cz

ABSTRACT

Many organizations are re-evaluating their approach to delivering enterprise applications, and are looking for ways to control IT costs. There is growing evidence of reluctance to fund large-scale implementation projects, and of tighter budgets forcing more careful cost-benefit analysis to justify IT investments. These efforts to control IT costs lead to consideration of alternative models for delivery of enterprise applications, such as the Software-as-a-service model or ASP (Application Service Providing).

This paper discusses the business drivers for application servicing and gives a detailed description of the Software-as-a-service model in comparison to traditional one. It brings the arguments that the Software-as-service model constitutes a viable alternative to software licensing for many application types today, and will become the dominant method for delivery of enterprise applications in not too distant future.

Keywords: Software-as-a-service model, ASP, application service providing, Utility Computing

1. INTRODUCTION

The traditional approach to the implementation and operation of enterprise applications typically involves the purchase of hardware and software platforms from technology vendors and their implementation within the organizations, in most cases drawing on extensive assistance from external consulting organizations, in order to tailor the application software systems to the specific needs of the organization.

This model has been used extensively in the context of ERP systems, and has been applied to other types of application including CRM, Data Warehousing, and Business Intelligence applications. Almost invariably, situations where organizations own and maintain their entire IT infrastructure and application systems, lead to very high cost of ownership, and consequently high levels of IT spending which can detract from the core business that the organization is engaged in. Gartner research estimated that big global banks allocated 15-20 percent of their operating budget to IT in 2002; this percentage had grown by 50-60% over five years. There is now increasing evidence that traditional model, which involves *ownership* of software and the associated IT infrastructure, is not sustainable in the long term. Significantly, many businesses are now doubtful about IT benefits altogether, and are no longer prepared to fund large-scale implementation projects [3]. Some even argue that the productivity improvements once assumed to be the result of technology investment are an aberration related to other factors such as longer working hours [16]. In an attempt to improve ROI (Return on Investment) and improve focus on core business many organizations have adopted partial, and in some cases full outsourcing of IT systems. However, companies that provide outsourcing services tend to use the traditional software implementation and maintenance approach, and hence suffer from similar high levels of cost.

As a result of these developments IT vendors are intensively evaluating more cost-effective models for the delivery of enterprise applications. In late nineties, a new *application service model* has emerged as an alternative to the traditional approach, mainly in the form of providing application services over the Internet. Delivering applications as services has a number of advantages from the point of view of user organizations.

This paper discusses the business drivers for application servicing and gives a detailed description of the Software-as-a-service model in comparison to traditional one. It brings the arguments that the Software-as-service model constitutes a viable alternative to software licensing for many application types today, and will become the dominant method for delivery of enterprise applications in not too distant future.

2. BUSINESS DRIVERS FOR APPLICATION SERVICING

In this section we consider the main business drivers that are forcing the transition to a new model for the delivery of enterprise applications.

2.1 High cost of IT projects

Problems of controlling the costs associated with IT projects are well documented. Notwithstanding the long experience that the IT industry has with the implementation of enterprise applications, costs of many projects significantly exceed their original budgets. According to a study of ERP implementation projects of 117 US companies 25% exceeded their

budgets, 20% were abandoned before completion, and 40% failed to achieve business objectives [17]. There have been many similar studies of this type that clearly demonstrate that the traditional model of implementation and maintenance of enterprise applications is associated with significant risks that are not being addressed by improved implementation methodologies and more technologically advanced software platforms. Outsourcing of the implementation and maintenance of enterprise application does not always bring anticipated benefits as the implementation methodologies and technology architectures used by outsourcing organizations do not differ substantially from methodologies used by end-user organizations.

2.2 Fast rate of technology change

Another significant risk factor associated with enterprise applications is the rapid development of underlying technologies requiring costly and time-consuming updates. There is growing evidence that end-user organizations are unable to absorb new technologies at the rate that vendors produce them, and are locked into a *vicious* cycle of migrations and upgrades. New technology platforms, or new versions of existing applications are often forced on end user organizations by technology vendors who are reluctant to support older versions of their products; implementation of new versions may not lead to any direct business benefit.

2.3 High demand on IT skills

The traditional model of implementation of enterprise applications is associated with high demand on IT skills, but many small and medium size enterprises (SMEs) cannot afford to maintain their own internal IT staff. Another contributing factor is that the expertise of IT specialists employed by end-user organizations and third-party consulting companies is often not up-to-date and significantly lags behind the expertise available from the technology vendors. This leads to poor implementation results, and is a major cause of high-rate of failure of IT projects.

2.4 Complexity of ERP systems

ERP vendors have attempted to deliver a comprehensive enterprise application solution that satisfies the requirements of a large number of organizations irrespective of the industry and the needs of individual businesses. This approach resulted in highly complex solutions leading to increased cost of ERP solutions that the client organizations are no longer willing to accept. The utilization of the overall functionality of an ERP system by end users is relatively low.
Customization to suit the needs of individual customers requires high level of expertise to setup a large number of configuration parameters. Lack of knowledge of client's business processes by the consultants is another key factor according to recent studies that inhibits successful implementation of ERP systems [13]. ERP systems are characterized by high complexity of operation even in situations where the corresponding business process is relatively simple, and that leads to high cost of training of end users. The demands on hardware resources increase as new versions of the software are released.

2.5 Globalization of business environment

Globalization has two important influences on enterprise applications. Firstly, as a result of globalization and the formation of regional economic blocks with standardized business processes and regulations, ERP systems are becoming more generally applicable and require less customization to suit individual countries. This is particularly significant in the European Union with growing number of member countries using identical business laws and regulation; this will eventually lead to standardization of ERP applications across the entire region. Second important influence is the global deployment of enterprise applications. Many large companies with worldwide offices implement global applications across the entire enterprise, in some cases using a single centralized data center and centralized applications accessible via the company's Intranet. This simplified environment, with standardized business processes across the entire organization is highly suited to implementation using the ASP model.

2.6 Increased acceptance of outsourcing

There has been an increase in awareness of alternative models for the implementation of enterprise applications, in particular of the outsourcing model. Organizations are aware of the need to focus on their core business, and are prepared to consider outsourcing other business functions, including their ERP applications.

3. RECENT TRENDS IN APPLICATION SERVICING

Application Service Providing (ASP) emerged towards the end of 90s with claims of extensive advantages for client organizations, in particular for SMEs. Notwithstanding many perceived advantages the ASP approach has not gained wide acceptance as the new model for delivery of enterprise applications. Many of the early ASP providers have not been able to establish a viable business model for application servicing, and have discontinued ASP services, or went out of business altogether. Other factors contributing to the failure of early ASP providers included lack of a suitable technological infrastructure for hosting a large number of complex enterprise applications in a scalable and secure manner, poor customisation capabilities, and almost total lack of integration facilities. As a

result of these shortcomings, early ASP providers failed to deliver major cost savings to their customers, resulting in poor acceptance of application servicing by the market place.

Recently, however, a number of important IT vendors have re-confirmed their commitment to application servicing in the context of the new Utility Computing approach, and have made large investments in infra-structure for the delivery of application services [6]. Given earlier experiences with traditional outsourcing and ASP most user organizations remain sceptical about ASP and are waiting to see if the benefits are going to be realized as claimed by the vendors.

3.1 IT business factors

As a result of the recent IT downturn the sales of new licenses for enterprise application software have stagnated and in some cases declined. There is some evidence that as the enterprise application software market matures, major ERP vendors are changing their revenue model to decrease their reliance on new software licenses towards income generated from software license upgrades and product support [18], [19]. This combined with the fact that most organizations spend as much as 80% of software-related costs on software maintenance and related activities [11], creates a situation where licensed software is de-facto *rented. It is precisely this high-level of on-going costs that motivate many organizations towards alternatives such as outsourcing and application servicing.*

3.2 Emergence of Utility Computing

The main idea of Utility Computing is that IT services are supplied on demand (i.e. as required by the end-user organization) via a grid of interconnected, dynamically configurable, highly reliable and scalable computing resources (i.e. servers, storage, and applications). Computing grid provides an ideal infrastructure for application servicing as it can host a large number of ASP applications in a scalable and reliable manner. *Resource sharing and improved hardware utilization of grid computing environments provides a more cost effective solution for hosting enterprise applications than a set of independent servers each dedicated to a specific application*.

A number of infrastructure vendors (IBM, HP, Oracle) are in the process of building large data centres with the view of moving towards the Utility Computing model [7]. *Investment in infrastructure on this scale clearly demonstrates a strategic commitment to Utility Computing and more specifically to application servicing as the new outsourcing model for enterprise applications*. Recent efforts to standardize Utility Computing infrastructure in order to facilitate interoperability between vendor solutions led to the creation of Utility Computing Working Group under the auspices of DMTF (Distributed Management Task Force) [5] and with the participation of major IT players including Cisco Systems, EDS, EMC, HP, IBM, Oracle, Sun Microsystems and VERITAS. The main objective of the DMTF Utility Computing Working Group is to develop a set of interoperability standards in collaboration with other organizations including OASIS (Organization for the Advancement of Structured Information Standards) and GGF (Global Grid Forum) that will allow the assembly of comprehensive services from components supplied by different vendor platforms.

3.3 Role of SOA and Web Services

Another key trend favouring application servicing over the traditional software-licensing model is the move towards service-oriented architecture (SOA) for enterprise computing. The nature of enterprise applications have changed dramatically over the last five years; most enterprise applications today have requirements to interoperate across enterprise boundaries (i.e. requirements for e-business). Service-oriented computing based on Web services standards and technologies is widely regarded as having the potential to address the requirements for e-business interoperability and are likely to become the dominant enterprise computing architecture in the future. There is a close relationship between application servicing and service-oriented computing. Web services are regarded as the enabling technology for the integration of ASP applications, and for delivery of low-granularity application services [8]. The wide adoptions of Web services standards across the various computing environments (i.e. .Net, enterprise Java) makes Web services an ideal solution for application integration, and for exposing selected business functions of complex enterprise applications.

In summary, business and technological factors discussed above have created a situation where delivery of enterprise application in the form of services becomes both technically possible, and economically desirable. This is likely to have major impact on enterprise computing over the next five years, finally tipping the balance from licensed software towards software delivered as a service.

4. COMPARISON OF THE SOFTWARE-AS-A-SERVICE MODEL WITH TRADITIONAL MODEL OF APPLICATION DELIVERY

ASP or the software-as-a-service model has crystallized into specific service delivery model in the last two years. In Table 1 we analyse the application service model from three perspectives: design and technology, business, and IT management viewpoints [10], [14], [15], [20], [21]. We compare the ASP model

with the traditional approach in which software vendor sells the software license and the customer runs the software on its own technology infrastructure. This analysis emphasizes the features of the ASP model that can help organizations to solve their IS/IT problems in new and more efficient ways then the traditional approach.

Table 1: Comparison of the software-as-license vs. software-as-service models for enterprise applications

ifferentiator	**ASP (SW as Service)**	**Traditional Approach (SW as License)**
Main characteristics	Application service provider controls all necessary IT resources and delivers application functionality to a large number of customers as a service via Internet. Many users from different organization at a time use the same application.	Software vendor develops the application; the application is implemented on customer's HW and customer is responsible for the operations.
Design and technology Issues		
Design premise	Designed from the outset for delivery as Internet-based service for a large number of customers. It includes specific HW and SW architectures, and business model.	Designed for implementation by specialist and for customer to operate and maintain.
Technological architecture	Multi-tenant service oriented architecture designed to run hundreds or thousands of users from different user organizations on a scalable technological infrastructure.	Architecture suitable for deployment by individual company on a dedicated IT infrastructure.
Client interface	Browser is the main and often the only interface for all applications. It eliminates the need to develop, install, and support multiple client interfaces.	Many SW vendors have added browser interfaces, but most support multiple clients – it increases development, installation and support costs.
Service management	Applications with embedded service management, monitoring metering and security capabilities.	Typically must add service management, monitoring and metering features subsequent to product development.
Upgrades	Frequent (every 3-6 month) upgrades possible. All customers are upgraded simultaneously resulting in significant cost reductions.	Infrequent, major updates (every 12-24 months). Individual customers may be running different versions of software. Both, provider and customer, have to implement version management process.
Business Issues		
Readiness of the service	Short implementation cycle. Typically no requirement for new HW and SW	Long implementation cycle due to complex implementation of HW, SW, and knowledge transfer to customer sites.
Availability of the service	The service is available from any location (globally).	Could be limited to single organization via intranet or client/server interface.
Scalability of the service	The volume of the services delivered (i.e. number of users supported, number of transactions) can be scaled (up or down).	Configuration needs to support peak requirements, and cannot be scaled down.
Reliability of the service	Typically very high. Provider can more efficiently invest in network and systems redundancy. If he does not assure high reliability he loses customers' business.	It is very expensive to provision true fault-tolerance for in-house applications. Most companies remain at risk and typically experience periodic downtime.
Flexibility to business changes	Good if alternative service providers are available.	Good if the business change requires only minor application changes. Inflexible if the business change requires major application changes or new application development.
Customisation	Typically limited.	Extensive customisation possible (at both configuration and source-code levels), but expensive.
Functionality	Often limited functionality, application typically designed for narrow vertical market.	Extensive functionality, customers often use only small part of the available functions.
Evaluation of an application by user	The application can be evaluated before the purchase.	Application is evaluated after purchase, installation and customisation.
Internal sources utilization (people, technology, etc.)	Only few internal sources used for IT processes support. Most of the company sources can be used for core business processes.	Many internal sources used for IT processes support.
Costs of IT	PredITable, no investments required -operating costs only. The costs are highly correlated with the volume of services.	Both investments and operating costs. High overhead costs given by depreciation and amortizing of investments. The costs may not correlate with the volume of service delivered.
IT management Issues		

ifferentiator	ASP (SW as Service)	Traditional Approach (SW as License)
Subject matter of the contract	IT Service (SLA). The main parts of SLA: *content of the service* (functionality, data, training, support,...), *volume* (number of users, number of transactions, volume of data,…), *quality* (availability, response time, security,…) and *price*.	Usually, the contract divided into several subcontracts for hardware, SW licence, service (implementation, integration, training, upgrade,…).
SLA	The usage of SLA is a standard requirement	SLA in most cases not used.
Responsibility for IT infrastructure	Provider.	Customer (but some of the activities often realized by third parties).
IT sources utilization	IT sources of the provider (HW, SW, IT specialists) are used across all customers; provider has advantages of economies of scale. Customer IT sources are minimized.	IT sources are used only for one organization.
IT knowledge required at customer site	How to use IT for competitiveness enhancement, available services at IT market, SLA structure, and management of service delivery.	The same as in ASP plus: wide spectrum of IT knowledge. The required IT knowledge is dependent on number of platforms and types of application used. Extensive technical training needed
Size of IT personnel at customer site	Very small.	Large – different types of specialists needed.
Problem and change management procedures	Short feedback cycle - procedures enable almost immediate feedback. Support staff or programmers can directly identify and fix problems. Fixing a problem for one customer fixes it for everyone, which reduces support costs.	Problem solving is often indirect via intermediaries (VARs, SIs, etc). Patches and upgrades are implemented at individual customer sites. Costly and unreliable, as customers often delay installation of patches and upgrades.
Main risks	Loss of expertise that could be useful in the future. Stability of the provider (Exit strategy). Unsatisfactory customisation. Unresolved systems integration issues – who should be responsible for integration? Enhancements not under control of the customer. Security, satisfactory response time.	Stability of the provider – but not to the same extent as for ASP. Technology backwardness. High TCO (Total Cost of Ownership). Low flexibility and scalability.

The above table includes a number of compelling arguments that will make the software-as-service model a preferred solution for enterprise applications delivery in the future. Many of the benefits listed above are results of recent technology advances and increasing expertise of services providers.

Given the current ASP limitations suitability of applications for ASP delivery needs to be evaluated, as certain types of applications may not be suitable candidates for application servicing. More specifically, these applications include:
[1] Mission critical core business applications – typically not available from external providers (the critical nature of these applications dictates in-house implementation and control),
[2] Highly customized and specialized applications (providers can not gain economies of scale as the number of customers using such applications is very small),
[3] Applications with extensive integration requirements (such applications have close dependencies on other enterprise applications and cannot be effectively managed externally).

On the other hand, standardized applications such as ERP or CRM are good candidates for application servicing.

5. THE IMPACT OF ASP ON THE IT LANDSCAPE

There are important consequences of the shift from the software-as-license model to the software-as-service model for the delivery of enterprise applications. The emergence of Utility Computing as the new paradigm for enterprise applications will have major impact on the IT landscape, creating new opportunities and challenges for both the providers and customer organizations. The reduction in the size of the traditional software license market, reduced demand for on-site implementation and the corresponding increase in demand for application services will lead to further rationalization of the IT vendor market [4].

The shift towards the service model for delivery of enterprise applications will take several years to be fully realized, but the impact on IT industry as a whole, and software vendors and third-party consulting organization in particular will be dramatic. It will result

in restructuring and re-alignment of the major industry players that will favor large software vendors who are already successfully delivering application services to end-user organizations. Consulting organizations whose main activity is implementing ERP systems and similar applications for client organizations will need to re-focus their business activities, as there not likely to be many large-scale implementation projects of this type in the future. The ASP model will be associated with new pricing models that are likely to dramatically reduce the cost of ownership of enterprise applications.

Reduction of demand for in-house IT specialists will lead to the restructuring of the IT labour market, and will demand important changes from user organizations that will need to implement suitable management structure and IT architecture that enable effective participation in the world of service-oriented computing.

6. CONCLUSIONS

In conclusion, the ASP or software-as-service model provides a viable alternative to traditional software licensing model for many application types today, and it is likely that the ASP model in combination with Utility Computing will become the dominant method for delivery of enterprise applications in not too distant future. *The main reason for it is that ASP model enables cheaper and more flexible IT service delivery than the traditional one*. This view is supported in the literature, for example Gartner ranked "software as service" as one of the current megatrends and predicts that up to 40 percent of all applications will be delivered over the Internet within the next 2 to 3 years.

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