Serviam Company Visits

Part II

Business Value

2005-01-20

Eva Söderström and

Peter Söderström

SERVIAM-LIT-10

Version 2.0

19 pages

Table of Contents

1   Introduction

During the Serviamproject, a number of visits to participating companies were undertaken, where their views on and use of WS and service-oriented architectures were discussed. This report will focus on the business aspect of these discussions, including business values, problems and challenges, legal and financial aspects.

Most of the companies in our study started considering WS as a means of integration between disparate systems. Previously, every couple of systems to integrate could require its own special solution. Another main reason was redundant storage of data, for example concerning customers. This led to problems in updates and information transfers, with data being spread among the systems. Reducing batching and queuing is another motivation for a transfer to WS technology. One common solution for internal WS integration is to create a form of "broker" which acts as a single point of entry that connects existing systems. The "broker" facilitates updates and provides a uniform presentation of data.

2   Business values

There are different types of business values for web services. This chapter introduces a summary of values identified in the discussions with the companies, and compares this material to literature sources. In Söderström (2004), 10 groupings of business values were derived from literature. These groupings till be used in this report as well when presenting the company view on these values. The aim is to facilitate comparison and discussion about the subject.

2.1   Providing and consuming services

WS brings the opportunities to expose legacy system and mainframe functionality externally in ways not previously possible. For this, service-oriented architectures are one means, where WS are included. The provisioning of this functionality in turn enables organisations to make money internally and to raise the competence level of employees. Opening up internal information in this way to for example customers and partners creates additional value, shortens throughput time and also delivery time.

2.2   Exchange of business information

One aspect of exchanging business information is that packaging information using WS enables a new way of presenting our products to customers, for example by using the information packages in catalogues. This also enables reuse of services, which raises the concept of reuse to concern not only code, but also services themselves. Having WS on a business level where services are shared leads to the realisation of rationalisation gains.

2.3   Increased revenues and competitive power

One dominating aspect here is the customer adaptation opportunities brought about by WS. One example of how this adaptation is made possible is that interfaces can be diverse to different customers, although accessing the same systems. The value for customers increase, since they save money in comparison to continuing to operate in the traditional way. If customers are satisfied, the value also increases for the organisations providing the adaptation. Another aspect relating to customer adaptation is that WS enable organisations to trigger processes from the mainframe. In doing so, organisations can be more proactive towards their customers, in for

example providing important information earlier than would have been possible in the traditional ways. One example of such information is delays in deliveries.

2.4   Integration

Integration is one of the most central reasons for why the organisations decided to move to WS in the first place. The advantages concerning integration are therefore many, and the enablement of integration per se is considered to be one of them. One aspect mentioned is the possibility to remove redundancy in data storage. This in turn removes many of the existing update problems, where data previously had to be updated in several places. Another important aspect is that by creating a single point of entry, which many organisations to using a kind of "broker" to existing systems, a common solution is enabled. Thereby, there is no need for having many different systems dealing with the same things. A "broker" connecting systems also enables these internal systems to be preserved. Many of these systems cannot easily be replaced, and being able to preserve them is therefore a positive effect of WS. A common concepts model in an organisation saves time when performing the integration. One reason is that it enables reuse and does not require concepts negotiations for every integration project.

2.5   Automation

Many organisations create WS to achieve uniformity in the way of working. One example is to enable calculations to be performed in the same manner. This makes calculations of the same data producing a uniform result, as well as enabling the data to be presented in the same way. Thus, another example of uniformity is to format and present information in similar ways for different activities. Uniformity also enables automation to a greater extent. Some organisations also claim that uniformity raises quality and performance in a long-term sense. Actions are performed similarly, and even mistakes are performed in the same way when they are made.

2.6   Time-to-market

No remarks were made by the organisations.

2.7   Middleware and applications

Besides the "broker" already mentioned, a common solution for achieving WS functionality in organisations, business value can also be achieved when applications are scaled and levelled correctly. The scaling has been mentioned to be one key aspect in WS.

2.8   Improved productivity and efficiency

No remarks were made by the organisations.

2.9   Application development

Component-orientation is regarded as important when developing applications for WS. One example is that the development can be distributed across geographical regions and compiled later. Component-orientation is also closely related to reuse of code and services. This enables systems evolution to be quicker, and organisations hence save time. Furthermore, WS may take time to develop at first, but the more experience that is gained, the more the value becomes clear of this kind of approach.

2.10 Cost reduction

One major argument to management is that WS save costs. This aspect has been mentioned by our organisations as well. One aspect is that the amount of administration can be reduced inside organisations. Instead, this can be automated, or outsourced to partners and customers while at

the same time raise the customer value. This means financial implications for organisations according to their calculations. One example is that customers can do the simple work themselves, which gives sales personnel more time to focus on more complex orders and quotations. The effect of WS can also be an increase in sales. If customers know they do not have to wait for service, they are more likely to choose this alternative again. Availability of WS thus increases the demand.

3   Business drivers and SOA technology

3.1   Business drivers

All businesses are driven by a number of criteria, which we have chosen to call "Business drivers". Much simplified, these criteria can be divided into requirements for:

- Profitability
- Competitive power/public good

Sustainable profitability in a long term perspective is a requirement in common for all commercial businesses. Most businesses, however, go even further. The business must have conditions allowing them to grow and/or improve. In a commercial business, we speak of competitive power, and in public businesses of value or public good.

In service-orientation, we have noticed another underlying factor, which we have called industry influence. This is when methods of work and standards are developed in an industry branch. These do not necessarily bring profits or values for a single actor, but there is still a strong industry (or legal) pressure for individual actors to adapt. Based on this result, our simple model consists of the following business drivers:

- Profitability
- Competitive power/public good
- Industry influence

3.2   Success factors relevant for SOA, e.g. with web services.

We have, based on empirical material, studied which success factors that seem to support these three business drivers. Table 1 illustrates the results.

Perspectives for businesses and public organisations respectively	
General business drivers	**Underlying critical success factors**
Profitability	Higher revenues
	Lower costs
Competitive power/public good	Service
	Exposed assortment of products
	Lead times
	Time-to-market
	Mergers, acquisitions and partner collaboration
Industry influence	Standardisation of business processes

Table 1: Business drivers versus success factors

3.2.1. Profitability – higher revenues

Web services enable more effective IT development and maintenance, for example through their documented efficient development environments. Business developers and requirement holders also become more efficient, in particular if there is a base of basic services that easily can be combined into new services, according to component thinking such as LEGO. Many of the intellectual resources in a company then are freed from detailed work like specifying and building services, to more strategic tasks.

3.2.2. Profitability – lower costs

We can clearly see how partner collaboration is run efficiently through the use of services. These often consist of existing systems that have been disconnected into services and that have received general interfaces. The result is a high ambition level at a low cost. Furthermore, development costs for, for example, web services are in most cases reported to be a fraction of the cost of alternative technology.

3.2.3. Competitive power – Exposed assortment of products

Today, customers expect direct access to information about a supplier's assortment of products, and to be able to place orders according to this information. SOA enables the transformance of existing storage systems into globally callable services. For many companies, the capability to perform these rapid change-overs are crucial for survival.

3.2.4. Competitive power – lead times

One important competitive means is to be able to deliver a product in a certain, short time period, and with the features desired by the customer, and to be able to provide binding confirmation of this at the time the order is placed. Compared to traditional organisations, however, this requires significant changes both technically and organisation-wise. Most businesses must utilise partners in order to compete with prices. Therefore, a real-time connection with partners is essential, which should be easy to re-organise to other partners or other types of products. SOA is the only efficient solution here, as demonstrated by several highly profitable companies. Logistics companies are at advantage, with services directed to both receivers and senders, where all partners have transparent insight into the status of the deliveries.

3.2.5. Competitive power – time-to-market

The time from an idea to a customer-accessible product is becoming shorter and shorter. Not the least within IT and telecom, where the life span of certain products only lasts for a few years. Given these circumstances, it is important to rapidly be able to develop all needed systems: a SOA built on a large number of general, basic services. Reuse is necessary for achieving this goal, as is an efficient and secure development environment. Legacy systems must be utilised, and new applications be built in a way that enables services to be uses on many platforms.

3.2.6. Competitive power – mergers and acquisitions

The business climate of today presupposes co-operation, either through partnerships or through mergers. One of the main problems at mergers has traditionally been to get IT systems to co-operate. The transition to SOA facilitates such co-operation, by giving older routines a service interface to be utilised over the web. One pre-requisite for this to work is to have matching concepts between participating organisations, which normally is difficult to obtain.

3.2.7. Industry influence – standardisation of business processes

Industry organisations and standardisation bodies have realised that a pre-requisite for rational production in most industries is the enabled exchange of information in as simple a way as possible. The start was standardisation of invoices and similar documents, which has resulted in standards such as Edifact. A common concepts base is crucial in company communication, at least regarding the most central concepts. Within many industries, standardisation work has grown both locally and globally. One example of global work is ebXML, which is intended to be a basis for electronic commerce. Locally, there are many industry initiatives. One example is the Swedish co-operation between life insurance companies and insurance brokers. A company can hardly remain outside such standardisation if they desire to stay in business.

3.3 How SOA fits for different types of organisations

Michael Treacy and Fred Wiersema identify three business strategies that create highly successful companies. These companies are either:

- **Customer-focused:** These companies know their clients well and fulfil most of their requirements. Examples are IBM and Avis.
- **Product-focused:** Innovative companies in the development forefront. Examples are Ericsson and BMW.
- **Production-focused:** These companies run their production efficiently with low costs. Examples are McDonalds and IKEA.

Let us see how these strategies fit in our model (table 2).

Perspectives for businesses and public organisations respectively		Focus on		
General business drivers	Underlying critical success factors	Customer	Product	Production
Profitability	Higher revenues	🟥	🟥	
	Lower costs			🟥
Competitive power/public good	Service	🟥		
	Exposed assortment of products	🟥		
	Lead times	🟥		🟥
	Time-to-market	🟥	🟥	
	Mergers, acquisitions and partner collaboration			
Industry influence	Standardisation of business processes			

Table 2: Business strategies versus drivers and success factors.

We can see that the customer-focused organisation has much to gain by service-orientation.

3.4   Which are the basic steps towards service-orientation?

We have identified a number of basic steps towards service-orientation:

I.   Providing services in general (e.g. the Tax public authority, which transfers from forms for income-tax returns to an income-tax return service).
II.   Exposing information (e.g. providing information about products)
III.   Exchanging information (e.g. with partners or customers)
IV.   Automation (i.e. replacing manual officers with computerised services)

These are placed in our model in table 3, where we can see that service-orientation primarily benefits competitive power/public good.

Perspectives for businesses and public organisations respectively		Focus on			Basic steps towards service-orientation	
General business drivers	Underlying critical success factors	Customer	Product	Production		
Profitability	Higher revenues	███	███			
	Lower costs			███		
Competitive power/public good	Service	███			**I** Provide	
	Exposed assortment of products	███				**II** Expose
	Lead times	███		███	**IV** Automate	
	Time-to-market	███	███			
	Mergers, acquisitions and partner collaboration				**III** Exchange	
Industry influence	Standardisation of business processes					

Table 3: Including basic steps towards service-orientation in the model

3.5 Business strategies supporting critical success factors

Table 4 shows examples of business strategies that support the critical success factors, in particular for SOA.

Perspectives for businesses and public organisations respectively		
General business drivers	Underlying critical success factors	Examples of business strategies supporting the critical success factors, and creating flexibility
Profitability	Higher revenues	Improved usage of intellectual resources
	Lower costs	Partner integration
Competitive power/public good	Service	Self-service through services
	Exposed assortment of products	
	Lead times	Global services for storage and logistics
	Time-to-market	Faster development of business processes/strategies
	Mergers, acquisitions and partner collaboration	Business process integration
Industry influence	Standardisation of business processes	Using industry standards for maintained (or increased) competitive power

Table 4: Business strategies supporting the critical success factors

3.6 Profitability

3.6.1. Improved usage of intellectual resources for higher revenues

Strategically correct, market-adjusted business processes give **higher revenues**. The intellectual capital is a narrow resource in most organisations. Business developers and managers at different levels are often busy maintaining existing business strategies. Studies of business leadership, in particular those under-achieving, show that all the time is spent administering existing strategies. The field is thereby open to competitors who keep updated on new trends. One well-known example is Facit's mechanical calculator. An efficient and flexible business and technology development facilitates the work for business developers and managers regarding ordinary work, and enables them to spend time on the business' strategic issues (i boken Out of the box av John Hagel III).

3.6.2. Integration med partners ger lägre kostnad

Konkurrenstrycket och krav på höga servicenivåer medför ett ökat kostnadstryck, men det är inte alltid möjligt att öka kostnaderna. En vanlig utväg i dag är att samverka med partners. Inom industrin är detta vanligt – man utnyttjar en krets av underleverantörer. Samverkan med partners är nu även vanlig inom tjänstesektorn. Integration kräver för det mesta samverkande system. Det är viktigt att detta inte tar för mycket tid och resurser och att kopplingen kan förändras när affärsläget ändras. SOA är en teknik som uppfyller dessa krav.

3.7 Competitive power

3.7.1. Self-service through services that expose the assortment of products and provide better service

Anyone having built up a number of purposeful services for customer communication can combine these to new services. It then becomes possible to easily create tailored service packages for specific needs or customers. One common, and successful, strategy is to expose the assortment of products directly towards the customer, using services, and thereby rapidly increasing the customer value. The customer can, for example, see if a certain product is in stock, can directly place an order, and so on.

3.7.2. Global services for storage and logistics give shorter lead times

Within manufacturing industry and logistics companies, service-oriented architectures are very successful. When the whole chain is service-based, the logistics process can be optimised, and the customer can adapt to exact timings for delivery.

3.8 Faster development of business processes/strategies provides faster time-to-market

SOA gives higher revenues through a better usage of the intellectual capital, as we claimed earlier. This occurs for example through SOA speeding up the development process. It is possible to combine different services, and create new ones.

3.8.1. Collaboration through integration of business processes

We have claimed that partner integration lowers costs. Integration enables primarily an increased opportunity for customer adaptation, by enabling customer matters in one step. The quality is raised by not registering the same information in multiple locations.

3.8.2. Industry-wise standardised business processes

One pre-requisite for being able to compete is often that the business adapts to industry standards. This may concern deliveries within the automotive industry, customer portals within insurance, payment services, and so on.

3.9   SOA – the connection between technology and architecture

All business drivers, success factors and business strategies mentioned in our model utilise that SOA, possibly implemented using web services, is built according to the system philosophy stated in the square below. It is a question of utilising **standards (A)** and a **hub-based architecture (B)**[1]. These factors, together with an **efficient development environment**, enables less resources to be spent developing and maintaining systems, plus reduced development time.

A. Factors e.g. dependent on **standards**
  1. Access to services regardless of platforms used
  2. Component thinking admits high adaptability in the service assortment
  3. Facilitated reuse
  4. The interface is independent of underlying logics, which e.g. enables the services to be independent of the often complex legacy systems

B. Factors e.g. dependent on **hub-based architectures**
  1. General and simple access to older routines
  2. Enabled access to services without unwanted insight into logics, data, etc.

C. Properties who, besides the factors A and B, are dependent upon an **efficient development environment**
  1. Less resources are required for developing services
  2. Less resources are required for maintaining services
  3. Faster service development

A, B and C are all placed in comparison to our model in table 5.

---

[1] ”Industry influence” is a special case, where only the items A1 to A3 are involved

Perspectives for businesses and public organisations respectively			Web services properties in a service-based architecture	
General business drivers	**Underlying critical success factors**	**Examples of business strategies supporting the critical success factors, and creating flexibility**	**Standards and hubs** (Factors A and B)	**Efficiency** (properties C)
Profitability	Higher revenues	Improved usage of intellectual resources	**All**	**All**
	Lower costs	Partner integration		
Competitive power/public good	Service	Self-service through services		
	Exposed assortment of products			
	Lead times	Global services for storage and logistics		
	Time-to-market	Faster development of business processes/strategies		**C3**. (Faster service development)
	Fusioner, uppköp och samverkan med partners	Business process integration		**C2**. (Less resources for maintenance)
Industry influence	Standardisation of business processes	Using industry standards for maintained (or increased) competitive power	**A1 – A3** only	**C1**. (Less resources for service development)

Table 5: Factors and properties in relation to our model

Only for integration with partners: the costs for standard products. We have studied the properties in the Serviam companies, as well as in a number of other companies, and the match is great between the companies and the model.

3.10 SOA technology

This section includes short comments on how the technology affects web services.

A1.   Access to services regardless of platform used. This is one of the basic features of web services.

A2.   Component thinking admits high adaptability in the service assortment. One main advantage with services is that they can be combined into new services. The simplest way is when a service creates its own window in the dialogue – then you just make the combination. It is more interesting when different services can call each other and/or be used in an application-unique shell. The result is an independence of service location.

A3.   Facilitated reuse. Reuse requires long term thinking, which applies to architecture, rules, organisation, quality assurance, and information spreading. One pre-requisite is the existence of general interfaces. One example is SOAP, which facilitates reuse of web services.

A4.   The interface is independent of underlying logics, which e.g. enables the services to be independent of the often complex legacy systems. Within object-orientation, messages are exchanged via the methods. The internal aspects of an object, such as data and logics, is hidden. Services via web services have the same feature. When services are developed as part of existing systems using traditional technology, the

service becomes dependent upon the system and must be maintained simultaneously. When SOA and loosely coupled interfaces are used, the dependency is limited to parts directly exposed in the service.

B1. **General and simple access to older routines.** Integration has always been complicated by the number of legacy systems. To replace old software with new is barely ever financially possible. Many companies have instead attempted to turn the software into services via a web service interface. This is applicable on batch systems as well. There are two main principles: either old terminal interfaces are used and each converted to its own service (which poses certain problems); or a better (and more cost-demanding) option to rewrite the user interface as a service. The simplest approach is if there already is a three-tier architecture where the user interface is a separate part.

B2. **Enabled access to services without unwanted insight into logics, data, etc.** Integration has previously meant direct contact between those responsible for included software, which to a large extent must be opened up to the partners. The SOAP interface enables access and collaboration only on desired items.

C1. **Less resources are required for developing services.** Many companies have completely gone over to developing new applications using web services, since this is considered to be rational in a long-term sense, and since it programming-wise is efficient. The result depends on the technical environment used to produce and maintain the services. However, also those utilising a minimum of software support have developed services relatively efficient.

C2. **Less resources are required for maintaining services.** SOA means a modularisation of the systems. The main gain is that changes often can be isolated to a given module without affecting the environment. The second time, changes can take place by combining modules in a new way. Furthermore, the connection to legacy routines can be made more rational.

C3. **Faster service development.** It is well documented that most technical environments used for building web services are more efficient than older technologies, e.g. since simplicity has been a main goal. Thus, also those utilising only the basic building blocks SOAP and XML can reach results fast.

Standard products such as ERP systems, CRM systems and the like are today built more and more on web services interfaces. A customer can more easily integrate with these, and the systems can be bought more modularly to a lower cost. Above all, the adjustment cost is lowered.

4   Problems and challenges

Web services come with great promises, but there are also aspects that may cause problems, These should therefore be thought of as challenges and potential pitfalls. In Söderström (2004), five groupings of problems and challenges were derived from literature. These groupings till be used in this report as well when presenting the company view on these aspects. The aim is to facilitate comparison and discussion about the subject.

4.1   Standards-related challenges

Core standards for WS are relatively well established. Still, there are concerns in this area. One is that the hype and discussion around WS and their opportunities has been far greater than attention to security concerns. Security standards are not yet mature, which may cause problems. Some standards do not adequately cater for the needs of organisations. UDDI has been mentioned as one example, since it is considered not to cover the functionality needed for, for

example, trust and contracting between customers and suppliers. The organisations like the idea of having a service catalogue, but consider UDDI to be insufficient for this purpose. Another standards-related issue is when old, existing systems and protocols may prevent full exploitation of new versions of standards. One example mentioned was that old MQ-versions do not fully support the SOAP standards.

4.2   Interoperability challenges

Interoperability concerns making systems, applications and organisations able to communicate. Integration is also part of this concept. There are a number of problems that may arise. One is that old systems rarely can be rewritten, since they may contain decades of business logic. The possibility to preserve internal systems using WS is therefore important, but the task is not easy still. In integration efforts where changes are made, the issue may arise that it is difficult to keep full control of which changes affect which (parts of) systems. The general idea brought forward is that something is always affected, but that predictions of what may be difficult. Changes may hence have undesirable effects. In some cases, changes must also be manually approved by employees. In this case, such services are rarely offered externally. One challenge is concepts co-ordination, for example between business areas. Most organisations believe it is desirable, but that the process of co-ordinating often is slow and time-consuming. Finally, some existing technologies for achieving integration and inter-operability through WS cannot cope with the organisations' requirements regarding complex transactions. One example mentioned was that .NET cannot handle numerous levels and types of schema, which are needed by one of the organisations for internal transaction management.

4.3   New possibilities and challenges

One key aspect is that needs and the business must be the drivers behind WS, and not the technology. WS should not be used just because they are possible, but awareness is needed as to why they are and should be used. It is not really a problem to create the WS, but rather in knowing what information to expose. There is also a difficulty of knowing who the customer of a service will be in the end. A balance must be made regarding how much time and effort to spend investigating the need for a service, and what possible uses different people may have of them. In this process, it is important to verify and decide what is critical. Another factor that may prevent organisations from coming up with and moving to new possibilities is the more someone is aware of technical possibilities and limitations, the more difficult it is to come up with brilliant and innovative ideas. This clearly demonstrates the need to combine knowledge skills and personnel types in WS creation and evolvement.

4.4   Knowledge and skills challenges

No direct skills problems were mentioned with respect to personnel competence. Rather, the problem mentioned reflects on the skills and knowledge of customers. The problem is that it is difficult for organisations to know and balance to what extent passwords should be regulated. Too much regulation may make customers negative, while too little may reduce security.

4.5   Legal and financial challenges

WS, as many other technologies for integration and interoperability, seem to require a certain number of users in order to be cost-justifiable. The organisations in this study mentioned how solutions with only a few customers are expensive, and that value and profit only can be derived with more players on the field. Furthermore, there is a difficulty in having an overview of who the service owner is, and how services are defined. However, financial and legal aspects are difficult as well to maintain an overview of, for example in terms of existing payment models,

Service-Level-Agreements (SLA), and so on. Technology has once again been mentioned as being the easy part.

5   Visions for the use of WS

On several occasions, the organisations we visited made statements about the future of WS in terms of what they wish for and what they intend to do. This chapter will present some of these ideas, which may indicate the path forward. The visions will be presented in the form of a list:

- We could consider using WS for describing information to a greater extent. The motivation is we communicate through so many different media, such as paper, diskettes, magnetic media, rented lines, and so on. This is a major work load for us, where WS may help us.

- One problem in the long-term sense is if public authorities such as ourselves working with developing generally usable WS should make these available to the public? It would be interesting to create an open discussion among public authorities in this respect.

- At the moment, we only use WS internally. The next step is to achieve a workable security solution to enable external WS and collaborations to happen.

- We could create common systems throughout the company for the information that is mutual for us, such as in the HR-systems and financial systems.

- It would be interesting to have the public authorities using the same conceptual method between us, as is used between the authorities and companies.

- Eventually, we would like to have input validation and output filtration, since we want the use of WS to grow. If there is any doubt in the input, the information should not be displayed. Input validation is hence the most important aspect of these.

- Loosely coupled systems are the goal. We construct building blocks.

- The drivers behind WS should in the future be a group of both technology experts and business representatives, such as legal experts. The technology and business levels must meet.

- One factor affecting how successful a WS effort will be is that the WS is business driven and not technology driven.

- WS must be documented, since an undocumented service is an invisible service.

- We need business models that take consideration to WS if we are to succeed with contracts, SLAs, financing and what kinds of services to make available.

6   Legal and financial aspects

One very important part of WS and the business perspective is the legal and financial aspects. This chapter will focus on various ways in which these aspects are managed today, and what potential problems the organisations have experienced or for-see to experience.

6.1 Legal aspects

Contracts between partners providing and using a WS are essential, for example to determine and regulate various responsibilities. Our organisations expressed how services and access to them often depends on a written contract, which regulates exactly what information for example

the customer is allowed to ask for and/or may get access to. Due to the regulations in the contract, there is a filtering of information before notification takes place. One organisation described their current contracts as being either between two or three partners. The latter is considered as being better, although more difficult to create at first. Their creation becomes easier the more experience that is gathered. The former in turn is easier to create, but not as good, according to the organisation in question.

One problem is in identification and authentification, and for example concerns trust issues. Some organisations find it difficult to know what to identify, if it is supposed to be a person or a legal actor. The latter refers to one single identification "actor" for an entire company. Depending on the answer on what to identify, different solutions may be required. Most organisations in our study have chosen to identify the legal actor and not the person, but it depends on the service provided. Authentication is often performed using server certificates which include identification of the "actor". These server certificates are often fixed, which may be a problem since some organisations have expressed a desire to be able to make changes in them. Many organisations solve the identification by having eligibility registries of who of the external customers are allowed to do what and to request what. These registries are then compared against when a request comes in.

One public authority mentioned three ways in which information can be provided to external customers:

1. A person contacts the authority him-/herself and searches for the information s/he wants

2. A request-produce-procedure (sometimes called notification), which includes someone giving a request for a certain file, after which the request is processed

3. Some requestors can have a certain type of information sent to them on a regular basis (subscriptions), for example changes in demography for a certain region

There are laws governing access and notification to information for public authorities. A separation exists between direct access and notification on a media for automated processing. This is, according to the public authority, a legal "black hole" where the law has not kept the same pace as the technology. Example problems are what notification means, and the fact that there are differences depending on to whom the information should be sent or notified. Legal experts do not agree on how to handle this. The public authority also expressed concerns regarding the first item in the list, since it is likely that there are aspects affecting this situation they have not yet considered.

The importance of legal aspects is clear to all organisations. This will in the future display itself in for example the formation of WS development groups that consist of both technology experts and business representatives, such as those with legal expertise. This reflects back to the notion that WS do not only concern technology, but that the business perspective is important as well.

6.2 Financial aspects

Some comments on financial aspects have also been made from the organisations in our study. These relate web services (WS) to either costs, profits, payment models and trade-offs. Some comparisons to the traditional way of operating were also made.

To begin with, as has been mentioned previously, using WS solutions with few partners is more costly than with many. WS are more likely to generate profits when used with several other partners. One way in which WS can bring costs is in them requiring new ways of working. These ways of working include thorough reflections and conscious thinking. WS also cost to maintain. Some follow-ups are made in our organisations on how much resources are needed for systems maintenance, for example in how much changes cost and how many changes that need to be

undertaken. These aspects vary between systems, however. Furthermore, systems development time for WS should not be too long. The cost of development must be justified. One organisation mentioned that its larger organisational group is prepared to accept the cost for development towards customer adaptation, with the motivation that financial experts often drive project on their behalf, and customer adaptation helps them fulfil their purposes.

There are many more aspects mentioned relating WS to increased profits and added value. One example is that information can be adapted according to customer needs. In spite of this costing money, the relation should be made to what the outcome and results are. Another relation between costs and results is that of the risk and consequences from a security leak being related to potential value to be obtained with this risk included. Many organisations use WS as a kind of "broker" between systems. This approach is regarded as being highly valuable, in for example the sum of time and costs for traditional ways of operating are larger compared to using this kind of integration. Another way of making profits from WS use is if the organisations are successful in standardising services and being able to request from new companies what kinds of questions to ask against the their systems. The cost is initially in a new way of working when WS are provided in this way, but in a long-term sense, this way of working is cheaper than the traditional approach. Profits also reside in functionality and us having a better package to offer our customers. While mentioning profits as being a fact, many organisations also say it is difficult to measure these profits. WS are still regarded as being likely to bring reduced costs and increased sales, according to calculations made. One cause of this is the possibility to reduce the number of employees.

Reduced and facilitated administration of WS has been mentioned as one major cost-reduction possibility. If customers know they do not have to wait, they are more prone to use this alternative again. Availability of WS thus increases the demand. It is possible, through for example customer adaptation, to transfer administration to others while still increasing customer value. There are financial implications for the organisations, since for example administration is reduced and customers do much of the simple work themselves. As mentioned, sales personnel can then get more time for more complex orders and quotations. Customers acting directly against systems also reduces their chances of bargaining, which may give rise to further profits.

One organisation commented on their payment models for WS. The following options were mentioned:

1. *Authorisation service*: developed for internal projects. The cost for the projects is slightly less than it would cost them to develop the service themselves. The consequence is that the service creators must have a financial fund to be able to maintain and change the services over time, without this being a burden to the projects.

2. *One-time payments*: this is a common approach, where payments are requested once for every WS.

3. *Yearly fee*: this would probably be more relevant than one-time payments, but would also require some extra functionality to be added to the WS.

The same organisation said it would like to charge per unit. One problem, however, is to know if this will be the right thing to do from a fairness perspective. It is not always clear who will be paying for the service in the end, which is why they do not charge per unit today.

7   Summary and advice

On a closing note, some advice can be mentioned based on the company visits. These "advice" were mentioned related to a short term perspective and a long-term perspective respectively.

7.1   Short-term aspects

One important aspect of starting with WS is to separate the presentation layer of applications from the sub-routines. The sub-routines can then be packaged and offered externally. The important thing is to produce a structure from subroutines that can be presented on the web.

Standards are under development, and some organisations believe it will not pay off to wait for a "perfect" standard or technology to emerge. Neither will it pay off to try to design "the" universal schema from scratch or do a direct mapping between for example XML and the database schema. One organisation claimed you should just do it yourself with an in-house solution.

7.2   Long-term aspects

The organisation, its method of work and assignment of development resources must be prepared for, which takes time. It cannot be done in a short time interval. Furthermore, systems should be changed towards more of transaction management and processes, as well as towards automation to level the outcome of using WS.

Attention is also needed to staff competences, and to allow for competence enhancement directed towards enabling and levelling the creation and use of WS. One example mentioned was staff working with mainframes needs training in order to be able to create things in XML. This is related to organisations adopting a new way of thinking and working. If so, they can better judge if applications can be transferred to the new WS environment. Having an overview is difficult, since there is a critical mass of information organisations need to keep in one place. In this way, however, you open up the mass of information considerably towards all customers/consumers.

8   References

Söderström, E. (2004) Serviam Literature Survey Part II: Business Value, Report no. SERVIAM-LIT-02, version 1.4, August, 2004

"The Discipline of Market Leaders", Michael Treacy and Fred Wiersema