The Emergence of Service Oriented Architecture from a Business Perspective

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“...SERVICES ARE THUS COGNAC ON A TAP” (RESEARCHER OF DIRECT COMMUNICATION, 2010)

ABSTRACT

This chapter describes and discusses the emergence of Service Oriented Architecture (SOA) from a business perspective. This view is rarely discussed in literature; the technical view is mostly talked about. The study is done as a qualitative, hermeneutical and inductive research. The different levels are seen as meta, macro and micro levels in the organization. Included in these levels are different domains; meta contains business vision and strategy. Macro has three domains; the domain of shared principles, the domain of decision process & makers and the domain of business process & development. Micro contains the service-based environment. Conclusions drawn are that ownership, communication and competence are factors that the different levels in the organization need to take into consideration.

The content of this article has its origin in a Master Thesis with the same heading as above, written at the IT-University Gothenburg in 2011. One of the authors is now a PhD student at Mid Sweden University and has been asked to contribute in this booklet with an extended abstract from the thesis. The booklet is to be published to honour Professor Stig C Holmberg, and I am grateful to have been asked to make this contribution in an early stage of my academic carrier.

Keywords: service oriented architecture, business development, business processes

1. INTRODUCTION

Organizations of today, whether they are privately held or public, act in a demanding context with stakeholders and requirements that continually change (Burnes, 2004). These demands are like new quality requirements, more
information to be sent to an authority or a new competitor. Dahlbom (2003) describes the evolution of a growing nomad society, with more volatile relations between the consumer and the provider. This society sets new requirements to connections, both in terms of time and quality. Benefit needs to be seen at once and also be measurable right away (Lundberg, 2009).

1.2 The background

Packaged services can be an important ingredient for organizations to meet the new customer demands (Marks & Bell, 2006). Standardized services need to contain a rich flow of information of good quality. For the providing organization, a new architecture must be built. Service Oriented Architecture (SOA). The architecture provides services which are exclusive for the customer and easy to maintain for the provider. Organizational information is a business asset (Magoulas & Pessi, 1998).

Technical literature about SOA is easy to find and also some literature with a business perspective. Unfortunately, literature with a business perspective is written by authors with a technical background which influences the content.

From the initial discussion, the thesis has the purpose of providing management at different levels, with factors to be considered when implementing a SOA in an organization. The research question is:

From a business perspective, which factors need to be addressed at an emergence of a Service oriented Architecture?

2. THEORETICAL FRAMING

This section is divided into four sections—SOA, Benefit Management, decision levels and SOA governance model. The purpose of the different sections is to provide a theoretical framing for the study.

2.1 Service Oriented Architecture

Fundamental concepts for SOA are services and architecture. A service can be seen as a business function (Marks & Bell, 2006), where a process is delivered repeatedly to the users of the service. Marks and Bell claim that the service consists of one business part and one IT part. Kanchanavipu (2008) says that business service should use the organization’s processes and assets, all in order to satisfy the consumer.

Architecture can be seen as:

The fundamental organization of a system, embodied in its component, their relationships to each other and the environment, and the principles governing its design and evolution. (OpenGroup, 2011)
Different views of an organizational architecture are needed, all in order to keep the communication on the right level (Erl, 2009). One concept in the architectural areas is the design, which describes the components to use (OpenGroup, 2011).

2.2 Benefit Management

The investment, which the new architecture actually is, needs to be evaluated and communicated. In the case of communication, the benefit matrix and benefit map are good models (Lundberg, 2009). In the model, benefit and resource usage can be seen. In order to benefit from the IT investment, knowledge and management must be in alignment with the business (Ward and Daniel, 2006).

One model that can be used for benefit management is Ward and Daniel’s (2006) Benefit Management (BM). This model starts from the business strategy and gives the investment’s areas that are most beneficial, named the driving forces. From the driving forces, in a Benefit Dependence Network (Ward & Daniel, 2006), business benefit gives the appropriate business changes. The IS/IT changes needed are then originated from the business changes, all in order to fulfil the business strategy. Ward and Daniel point out the importance of change owners with responsibility and authority to drive needed changes forward.

2.2 Decision levels

To answer the study’s sub question, different decision levels are introduced, meta, macro and micro (Hoffman, 1988). The meta level is described as the level where the vocabulary is created and the level where the ideal information system environment is created. Hoffman implies that the macro level describes strategic and tactical plans to achieve business’ goals with IT. Micro is the operational level where the guidelines on a detailed level are created.

2.3 SOA governance model

As indicated above, SOA with a business perspective is not easy to find. The SOA model below, figure 1, originates from Kanchanavipu’s (2008) SOA model with angle decision processes and decision makers.
Figure 1  SOA governance model (Ahlin & Andrén, 2011)

The meta level consists of **domain of business vision and strategy**, where the business mission, the uniqueness of the particular organization, should be reflected (David, 1989). The management at meta level needs to develop and communicate the vision and strategy throughout the organization.

The macro level contains three domains: **the domain of shared principles, the domain of decision process & makers and the domain of business process & development**. The **Domain of Shared principles** is composed of shared values, i.e. policies, standards and goal descriptions. Within this domain roles and responsibilities, i.e. the organizational culture is described. The next domain, **decision process and makers**, says how the decision process is organized and who can make the decisions (Davenport et al., 1992). The third domain at macro level is the **domain of business processes and development**, where the processes and their definitions belong. The influence any business process change has on the internal organization or external influence is included in this domain.

The micro level, the operational level or the **service-based environment** has three parts: service provider, service consumer and service broker (Kanchanavippa, 2008). The interactions between the parts are the base for the services and can be described as visibility, interaction and real world effect (MacKenzie et al., 2006).

### 3. METHOD

The study, performed as a Master Thesis at the IT-university in Gothenburg, in cooperation with the Viktoria Institute, has its main empirical base from Trafikverket (TV) in Borlänge. TV is a state agency, one of their responsibilities is the long-term infrastructure plans of building, operating and maintaining the railroads in Sweden.
3.1 Scientific approach

In order to answer the study’s research question (RQ), a qualitative research method was used. Berg (2009) describes this as a method which seeks to answer questions by various social settings and the individuals who occupy these settings. The RQ links human and technical behaviour, interpreted in a qualitative research process, called hermeneutical research process (Backman, 1998). Backman refers to a comparison between empirical base and the theoretical base as an inductive approach.

3.2 Data collection and analysis

One iterative step in the qualitative research method is literature review. The review has been made through search engines on the Internet and also by using literature from the IT Management program, IT University Gothenburg.

Empirical data were collected at four different interview sets, with fourteen different respondents. They represented TV within different IT and managerial positions (two interview sets), consultants from IT industry specialized within SOA and the last set of respondents came from the university. All the interviews were semi-structured with interview questions prepared in advance.

A data analysis was made from the empirical material, using different categories and sub themes from the theoretical material. The foundation of the study’s structure was prepared in a summarized form.

4. EMPIRICAL FRAMING

The study’s empirical material is presented from the three different levels; meta, macro and micro. The general empirical material contains descriptions of statements by the different respondents.

4.1 Meta level

Respondents are interested in discussing service development with the top management, since they have the official instruments, budget and organizational strategic decisions, at their disposal. Very seldom, services are mentioned in the business idea, and several respondents express that the top management does not have any knowledge about SOA as a concept. One reason for this can be that the concept is too abstract and difficult to overview. In industries with a long-term relationship between the consumer and provider, business ideas can express services in the form of service packages.

Respondents say that the IT strategy has to originate from the business strategy. The responsible role for this is the Chief Information Officer, CIO, or similar
official. In order to make communication easy, the strategies need to be short and powerful. To introduce a service oriented approach in the organization means to change from a functional oriented to a service oriented organization with strict defined domains. Otherwise, sub optimization can easily arise. Even though the organization uses SOA, pressure can be too high on the IT project to deliver according to project goal and not within the SOA frame. Several respondents say that ownership needs to be set for each service. The ownership can be both strategic and operational.

4.2 Macro level

To govern integrations at macro-level, an Integration Competence Center, ICC, is a useful to have. Members of ICC can justify development of new services in the right manner; communicate the benefit of developing services to IT projects and purchase services according to approved policies. Other roles mentioned by the respondents are different kind of architects, e.g. enterprise, solution and business. They all need to participate and decide upon solutions.

The bases for services are business processes, which need to be visualized in cooperation between IT and business sides. This work starts at an overall level and also includes stringent and clear definitions of the different processes. One proposed method is OASIS (Jones, 2005) where the services are broken down functionally. The top-down view will easier give benefit for the organization and prevent sub-optimization.

Most of the respondents say that nowadays, integrations are commonly used instead of spaghetti architecture. Many organizations talk about services, but they are rarely developed. Communicating the organizational benefit of using services is still a problem.

A service catalogue is a useful way to document services. This catalogue can be used by both the provider and the consumer. Unfortunately, the services are seldom documented in a good manner. Everybody understands the benefit of true and updated documentation, but this is seldom prioritized. A generally held service catalogue can prevent new, almost similar services from being developed.

At the start of service development, all the required competence needs to be put together to get a rich picture and decision plan. Several respondents mention the “Good Example” as a starting point for developing services. The “Good Example” consists of already existing services, developed independently. Competent actors within the organization can make incremental service development, often starting in the IT organization or business people familiar with external stakeholders.
4.2 Micro level

According to several respondents, the consumer’s requirement competence is seldom good enough. This way, the provider is given great control. If there is a service catalogue to order from, it is often written too technically and therefore not understandable for the consumer.

One driving force to develop services was to bring order to the IT department and by doing so; IT architecture came as an additional benefit. Another driving force mentioned was expected increase of customers and end-users. Before using services, the IT test process was too complex and changes created problems in other systems.

In the future, there will be different kinds of customers who use services, premium consumers and free-riders. Premium consumers will have fast access to services and information. Free-riders will be seen as undefined end-points to the provider and they will have lower access to service and information.

One respondent expresses that in the beginning, services were web services and technical solutions, but nowadays business orientation is also included. The respondent continues to discuss the lack of business visionaries, just to create new services.

5. DISCUSSION

This chapter will discuss theory and empirical data. The discussion will be held on the different levels, meta, macro and micro.

5.1 Meta level

The organization’s overall document is the business idea (David, 1989). The idea must be unique and must give an overall understanding for its context and purpose. Empirical data show that the business idea seldom mentions service as a concept and simply following old footsteps is easier than changing the existing business idea. Business and IT strategies are created from the business idea, and they should be aligned with each other (Henderson & Venkatraman, 1993). Strategies will be used for communication regarding the goals (Ward & Daniel, 2006). For them to be relevant, persons with the right competence need to participate in their development (Marks & Bell, 2006). The study shows that often different kinds of competences are missing, especially in order to create service strategies. One problem with a low number of participants is that energy, new ideas and innovation will be missed.

On a meta level, managers need to assign owners of the services. Empirical data imply that ownership gives the best benefit at a central level: ownership appointed
at a lower level can create redundant services. On the business side, there must be process-owners, both for internal and external processes (Sörqvist, 2004).

### 5.2 Macro level

The empirical material shows that one factor of success is communication and that linguistics needs to be stringent and adjusted to the target group. This implies that technical language is unsuitable when discussing with the organisation's business side. Marks and Bell (2006) indicate that SOA policies must cover the entire life-cycle. Furthermore, they say that documentation needs to be agreed upon, in order to make policies a natural part of SOA. Every policy must clarify ownership, responsibility and limitations. The individual service can be described in a service catalogue, in a single and unique way. Several respondents say that documentation is rarely collected, due to de-prioritization in single IT projects. These de-prioritizations, done from management side, can delay implementation of useful services.

Both theoretical pictures and empirical material show that implementation needs to be done in small, incremental steps (Sörqvist, 2004). This gives little interruption in operations and also successful services as examples, which the respondents called the “Good example”. Business processes will be broken down from an overall view and benefit is easier to discover at an early stage (Jones, 2005; Sörqvist, 2004).

Decision process within SOA at macro level refers to a more detailed strategic process. Development needs to be held together, in order to keep redundancy low. Participants in the decision process must come from both the business and the IT side, in order to keep the competence level high and mixed and also have a good communication further on in the organization. Checkpoints for SOA development need to be on a high level in order to make the decision as beneficial as possible for the whole organization. Communication from macro level regarding SOA implementation must be reliable and force the implementation, at micro level, to use SOA policies (Marks & Bell, 2006).

### 5.3 Micro level

The operational micro level comprises three parts; consumer, provider and broker. Their responsibilities limitations need to be defined (Kanchanavipu, 2006). In practice, this is often done in a Service Level Agreement (SLA). One outcome of a SLA is that all parts will gain new competence from each other; i.e. the provider will know more about the consumer.

The change leader must be managed from a top-down perspective (Marks & Bell, 2006). They continue to discuss the roles that the change leader needs to
cooperate with, e.g. the business architect or the solution architect. A follow-up needs to be communicated to the steering-group and other stakeholders by the change manager. This can be done in the form of the BDN (Ward & Daniel, 2006) and the study shows that communication has to be stringent and generally documented. It further implies that service development needs to start, and not include the heritage. Ward and Peppard (2002) say that benefit needs to be expressed for all IT investments, and this gives that the inheritance should be left untouched. Iterative implementation of services, according to Xue et al. (2008) and several respondents, with fast respond from the consumer, gives the best result. One respondent clearly expresses the knowledge demand for visionaries with domain knowledge, within the organization’s industry, when creating services. The domain knowledge, in combination with technical competence, makes the services implemented according to decided design patterns and also a good communication with the business side.

As discussed before, the business side has to attend the implementation of a service based concept. But it can be good idea to let the IT department start using services in order to have a structured and controlled way of dealing with the IT infrastructure. This is a standardized way of storing and delivering information (Newman & Friedman, 2005).

The service catalogue is implemented and maintained on the micro level, in any available software. Stakeholders of the service catalogue are both the IT and business side, and this way; it is the joining link between these two parties. Therefore, several respondents describe the used language as a critical success factor.

On the meta and macro levels, strategic decisions are made. The micro level is dependent on these levels and communication is given from them (Kanchanavipa, 2008). One respondent clearly states that the benefit and development perspective must be rich and give the operational level a conviction of what needs to be done. Also the ownership of development and maintenance needs to be fully described.

### 6. SUMMARY

The study has shown that three factors need to be considered at the implementation and emergence of SOA: **ownership, communication and competence.** **Ownership** needs to be connected on both a strategic and an operational level. The responsibility and authority regarding ownership has to be clarified to all stakeholders. These two parts of ownership, and also the factor that the service ownership lays both on the IT and the business side, will give dynamic to the service development and bring the emergence forward.
The factor of communication is seen from two perspectives in the study, the decision levels and the entire organization. The degree of details increases between the different levels, which means that the strategic communication from the meta level must be overall. On the macro level, the communication contains information regarding the architectural design of SOA and on the micro level, the communication is rather operational. This can be in shape of a service catalogue, which also can be seen as the connection point between consumer and provider. For the entire organization, the study implicates that language must be stringent and clear.

Competence is the third factor discussed in the study. Participants in different groups need to share SOA competence in order to make the emergence dynamic. This competence can come from the business or the IT side, and the participants also need to know what the knowledge requirements are for the level they belong to. The study implies that development of SOA often starts from a bottom-up level, due to the fact that the top management does not have the necessary competence regarding services.

The overall guideline from the study is that SOA is not just a technical implementation; it is a way to develop the business. The metaphor: “...services are this cognac on a tap” (researcher of Direct communication, 2010). Cognac can be seen as the rich information useful for the consumer and the tap is the standardized way the provider shall distribute the information.

REFERENCES


