



UNIVERSITY OF GOTHENBURG

# **Service-oriented Architecture**

**An Emergence of a Service-oriented Architecture from  
a Business Perspective**

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# Abstract

This qualitative study analyzes service-oriented architecture (SOA) from a business perspective. The business is divided into different decision levels for clarification of the liability limits for the affected actors. The study of SOA covers the areas from development to implementation. The work has been conducted in order to contribute to a business perspective for how a SOA affects an entire organization, as published literature is more technically oriented.

During the discussion and analysis of the empirical material did three reoccurring concepts emerge; ownership, communication and competence. These concepts were therefore discussed and analyzed within each decision level, and its adherent SOA-domains.

The conclusions are presented by the three reoccurring concepts:

- The ownership of a service needs to be clearly defined, and connected on both a strategic and operational level both for business and IT processes. This will create a balance between the actor groups' interests.
- Communication is essential and needs to be adjusted according to the level of the recipient. The linguistics needs to be adapted and clear within the level, as to facilitate discussions within dynamic formations, i.e. with representatives from different areas and with different backgrounds.
- The study indicates that the competence at the strategic level needs to increase, since this level sets the foundation for the possibility to implement services, in the form of budget and alignment. Alignment means to facilitate and demand that the business and IT must cooperate to be able to reach the target and thus achieve the benefit from a SOA.

The practical conclusions from this study are; communication is important in creating interfaces between decision levels and between different business areas. To develop services and manage interfaces for existing and parallel activities it has emerged that an iterative work flow is preferable, i.e. it is crucial to begin and then develop gradually. The implementation of a SOA needs to be structured practically by a project-model, which should be one the organization already is familiar with.

Three areas for future research have crystallized during the study. Firstly, good benefit-calculation models for services do not exist; the current models have too few dimensions to cover an all different perspectives of entire organization. Secondly, is to explore deeper within the area of communication between IT and the business. The final area covers the verification of this study's practical contribution, i.e. empirically investigate if the content of the decision-levels are coherent with an actual implementation of a SOA.

Key words: service-oriented architecture (SOA), architecture, actor-network theory (ANT), decision level, business process, business development

# Acknowledgement

To have the opportunity to explore deeper within a subject during a long period of time is an exciting assignment, which must be managed well. The excitement consists of the chance to choose an interesting topic, with different perspectives. Other pleasing features when studying refers to the chance of meeting and interviewing interesting people, as well as analyzing the material.

Along the way it has above all expectation been easy to attract respondents. Both respondents and our surroundings have shown a great interest in the expected result, which has supported us to push the task to its final goal.

We want to thank everyone who has helped us during this period, and especially to those close and dear for their patience.

Ultimately we want to thank our tutor, PhD student Taline Jadaan, for her support and guidance during this time. And also a big thank you to all eminent teachers we have encountered during our time at the IT-university.

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Karin Ahlin and Karin André

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## Table of abbreviations

<b>ANT</b>	Actor-network Theory (Latour, 1998)
<b>Architecture</b>	The fundamental organization of a system and its component's relationship to each other
<b>CEO</b>	Chief Executive Officer
<b>CIO</b>	Chief Information Officer
<b>SOA</b>	Service-oriented Architecture
<b>IT</b>	Information Technology, refers to the entire function, i.e. includes personnel, infrastructure and technology.
<b>TV</b>	Trafikverket, the state agency for traffic information, in this study the railroad part has been studied.
<b>Message-exchange system</b>	The system studied in the first set of interviews, the system is used for transfer of information for subscribers.
<b>ROI</b>	Return-on-investment (Olve, 2008)
<b>BDN</b>	Benefit dependency network (Ward & Daniel, 2006)
<b>Meta</b>	Decision level which refers to top-management and the overall view of an organization.
<b>Macro</b>	Decision level which refers to the level where shared and common principles and values of an organization are decided and documented.
<b>Micro</b>	Decision level which refers to the operational level of an organization.
<b>SAM</b>	Strategic alignment model (Henderson & Venkatraman, 1993)
<b>Service</b>	A support to facilitate repetitive business processes or support the creation of new business possibilities.

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# 1 Introduction

All organizations live in a context with stakeholders and demands, a context which continually changes (Burnes, 2004). For the main part of the organizations the stakeholders consist of employees, customers, providers and owners, in short everyone who set requirements on the organization. The requirements on the organization may for example consist of new yielding targets from the owners, new laws on the working market or more information required to be sent to an authority. These requirements indicate that changes in the context can influence the organization in both scope and degree of impact, and come from both internal and external parts (Sörqvist, 2004). As a part to describe changes, Dahlbom's (2003) description of the growing nomad society can be used. A society with more volatile relations between the provider and consumer set other requirements on the connections. The requirements for the connections can be described as; the starting-run to be able to use them is short, and if necessary, when suitable for the parties, be able to terminate a single connection or all of them. Substantially Dahlbom describes these connections as being qualitatively well from the first use, solving the problems the consumer and provider have. The problem-solving can be translated into that the delivery will yield benefit, a perceived consumer benefit from the beginning until the end. This sets high demands on the supplier of the connection, who must have knowledge of the industry where the business consumers operate in. They need to know the existing consumer and also have a perception regarding who the new consumers will be. The consumer benefit can be perceived, measured and analyzed together, as well as described visually to be able to make a decision (Lundberg, 2009). The terms used are then shown with financial measurements or through qualitative estimations.

For an organization to be able to meet the demands for consumer orientation or volatility packaged services can be a part of the solution (Marks & Bell, 2006). These services can be packaged in a standardized way and contain a rich flow of information and quality, which sets the requirements on the providing organization to introduce a service-oriented architecture (SOA). To answer the question about the richness of the information, Marks and Bell mean, the spread and demand for different services can be used. In order for the perception of the benefit for the different business processes to be that the services have a high quality (Sörqvist, 2004; Magoulas & Pessi, 1998). An example when development has changed business' processes and work-routines is Internet and its rich information flora. From a consumer perspective it is expected that an entry of a customer order is possible at any time of day, and without the need of support from anyone else. Another perspective is that the authorities can release a free access for the documents, making it possible for the individual to use their services and the availability for the documents is instant. This is the reason for the choice to explore deeper within the subject SOA from a business perspective, in order to bring the businesses a better understanding of what SOA really is and will affect the overall business at an implementation.

This study focus on different levels, both communication-levels and decision-levels, in order to clarify the liability limits between the levels. Another purpose with emphasizing the levels is that each level within an organization needs to be aware of what is meant to be discussed, decided and performed at an introduction of a SOA. It is also important for each level to understand the consequences of the decisions. The execution also needs to be done in a certain order, since the result from one level affects the adjacent level.

The development and production of services mean the entire organization must be active (Marks & Bell, 2006). The top-management must be active with the strategic approach and influence. Middle management is the level where the design is developed and the decisions are taken. Finally there is the operational level with the actual implementation. All of these levels cooperate based on their roles and authority to create the environment needed for service implementations. The cooperation can be described in the form of a net, according to the actor-network theory (ANT), where actors in the form of human and technical resources are available in mobilizing the net to become a more stable cooperation (Latour, 1998).

One of the respondents of the study expresses the following regarding information services:

*"... services are thus cognac on a tap."* (Researcher of direct communication, 2010)

At a first glance this statement may seem a bit unorthodox, but gives a good interpretation of what services are and what they can provide for the organization. The volatility of the information creates the tap as the symbol and the cognac the rich information for what the service must include. Those organizations who realize that information-services are a business-asset will have a competitive advantage. The services are to give a perception of being exclusive for you as a consumer, and at the same time be standardized and easy to maintain for the provider. From an organizational view the ownership of the services and their development will exist within the business it will support, but it is most often not the case (Bieberstein, Bose, Fiammante, Jones & Shah., 2006). The IT-organizations have become the owners of the SOA and thus it has had a more technical direction than is beneficial for the organization. SOA is a subject that prior to this study has interested the writers, through the technical architectural direction it has. After a deeper explorative research of the technical direction, in the course Architectural design at the IT-university, the focus moved towards the business perspective within an organization and how it will be affected by a SOA implementation. This time the focus was directed towards which levels within an organization needed to be involved and how they are affected. The verification that a SOA has received a strong technical direction caught the writers' interest and gave the direction of the study. Thus will the study focus on how a service-oriented development and implementation affects the entire organization, and how the growth of a service-oriented platform needs to be managed at the different levels within an organization.

Much literature has been written about SOA, and with different perspectives (Marks & Bell, 2006; Bieberstein et al., 2006; Erl, 2009; Kanchanavipu, 2008). The research performed by the writers before and during this study has shown the large amount of literature has mostly a technical view. Some literature claims to have a business direction, but is written by authors with a technical background and therefore lack the depth and anchor in its business direction. Literature with a pragmatic view misses the target and usually provides long and detailed descriptions of what SOA is and how to implement it technically. This study will be a complement to those SOA literature with more focus on the interaction between IT and business areas, and provide factors for a successful SOA implementation from an organizational view. The SOA will be described by the support of different domains (Kanchanavipu 2008). The organizational view will be studied from three different levels and the implementation of a SOA will be described from two different aspects. One of the aspects is the activities that drive the implementation and the other the implementation from a project-cycle perspective.

This study has the purpose of providing management at different organizational levels a better insight and understanding of which factors need to be considered when developing and implementing a SOA approach. With the starting-point from the above discussion this study will investigate the research question and its complementing sub-question;

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

***What do different decision levels need to consider in the process of developing a SOA?***

The focus of the study is to answer the research question from a business-organization's internal perspective. The study has the aim to provide the different management levels with factors needed to be addressed when developing and implementing a SOA. The descriptions of the adherent roles the decision levels need to appoint are held general. This is meant to provide the reader with a material which can be applied to his or her organization's positions and structure.



## Disposition

Chapter	Contents
1. Introduction	The first chapter contains the introduction and problematisation, which leads to the research question and its delimitations.
2. Theory	This chapter includes the theoretical pictures, which are SOA, ANT, and Benefit management.
3. Method	Chapter three describes the method and the empirical context for this study.
4. Theoretical framing	The fourth chapter provides further dimensions to the theory in order to create a good coherence for the rest of the study.
5. Empiri	A presentation of the empirical data, retrieved from the interviews.
6. Discussion	The discussion analyzes and discusses the empirical material and the theory for a SOA from a business perspective.
7. Conclusion	The thesis is completed with the conclusions drawn from the study and the practical contribution the writers present for businesses.
Appendix	A compilation of the interview questions separated into the four interview sets.

## 2 Theory

The theoretical framework of the study is structured according to the priority of the different scientific theories included, with service-oriented architecture (SOA) as the main theory. In support of structuring and answering the study's research question theories regarding organizational levels (meta, macro and micro), ANT and SACIS will be used. The Benefit model will provide support in answering the organizational benefits of development and implementation of a service, and how it can be communicated. The chapter begins with a discussion of two fundamental concepts: architecture and services. These will form a base for the SOA concept.

### 2.1 Architecture

In this section, the concept architecture and some of its different levels will be described briefly. A short process description of how an Enterprise Architecture changes will be given. Opengroup (2011) gives the following definition of what architecture is:

*"The fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution." (Opengroup, 2011 )*

This broad definition gives the void to describe different levels within architecture, something that is needed within an organization. Creating a comparison to a business the city-plan can be used in the business architecture (Erl, 2009). This business architecture gives an overviews plan for how the business will be built, with the help of the agreed architecture. The application architecture gives a description of the system-level, which Erl compares with the building architecture. Naturally, multiple levels of architecture in a business can be created, e.g. an overviews technological architecture or detailed network architecture. The governing documents of the architecture look different for all businesses and levels of architecture.

Other concepts to discuss in connection with architecture are patterns and design. The patterns in the architecture give the guidance regarding how the components will be used efficiently (Opengroup, 2011). Marks and Bell (2006) mean that patterns evolve at a practical use and provide a standard for how the different components can be used. The purpose to create patterns is increased usability and decreased run-time for analysis and research.

An architectural design describes which components to use (Opengroup, 2011). Erl (2009) points out the development of designs from a "spaghetti-orientation", i.e. an ungraspable design, to the purer design with web-services. Marks and Bell (2006) mean it is important to choose the right design as it can increase the benefit for the business. One of the aspects when producing the design is to make sure the chosen IT-solution will provide for numerous business possibilities, both at the present and in the future.



**Figure 1 Architecture Requirements Management, ADM (Opengroup, 2011)**

Figure 1 presents the process of how to change the business architecture, a change controlled by the different stakeholders' new demands. Examples of changes can be an external supplier with new demands, or demands from the own business to increase the efficiency. The governing business architecture (step A) gives input to the IS/IT architecture (step B and C). In step E the design is created, and thereafter a migration-plan (step F). The two concluding steps contain the decision regarding how the governance of the implementation and the change will be performed. All steps are managed and matched against the new demands.

## 2.2 Service

The word and the meaning of what a service really is, differs and have a great span. To visualize this, a few definitions of what a service is, are put together in table 1. The table includes the present definitions of service, and not the historical development of services and the service-concepts has been through.

Origin	Definition
Svenska Akademien (2011)	Contribute with
Nationalencyklopedin (2011)	Action or activity performed with the purpose of serving customers.
OASIS (2006)	Service has become the accepted phrase to describe how systems should be exposed and co-ordinated.

**Table 1 Definition of services (drawn by the writers, 2011)**

Marks and Bell (2006) put another dimension to the concept service when they describe services as a business function, where a process is delivered repeatedly to the service' users. To exemplify this can a bank's service to open a new account for a customer be used. The service includes different functions and can be used for the end-user with different requirements. To create this repetition of the business function the service is divided into a business part and an IT part. The business part is created within the processes of the organization. These processes span over different domains or departments, where the earlier mentioned re-usability can be achieved. Kanchanavipu (2008) states that business service means to use the processes and the assets of the

organization, i.e. employees, technology and other resources available, to meet the customer's demands. Marks and Bell (2006) mean the business service should be perceived as a communication-link between IT and the users of the service during the analysis and the design.

The IT-part of the service must be formalized, in order to be reachable and usable for all parts within an organization (Marks & Bell, 2006). The generic demands of an IT-service are that the service must meet the business' security and quality demands. The demands of an IT-service must be set and governed by the business, to be able to become the supporting part of the interconnected service needed by the business.

The interpretation of table 1 is, the purpose with services is to serve the customers (Nationalencyklopedin, 2011) and thus increase the business benefit (Marks & Bell, 2006). Other beneficial aspects, which Marks and Bell include when introducing standardized and repetitive services, are to decrease the costs and increase the agility of the organization.

## 2.3 Service-oriented Architecture

The theoretical pictures, which will be described in this part, are SOA from different perspectives and parts, e.g. business perspective, its reference model, attribute, description of the steps to deliver a new service, governance perspective and risks being considered.

One voice regarding what SOA really is, is expressed by Andersson (2010):

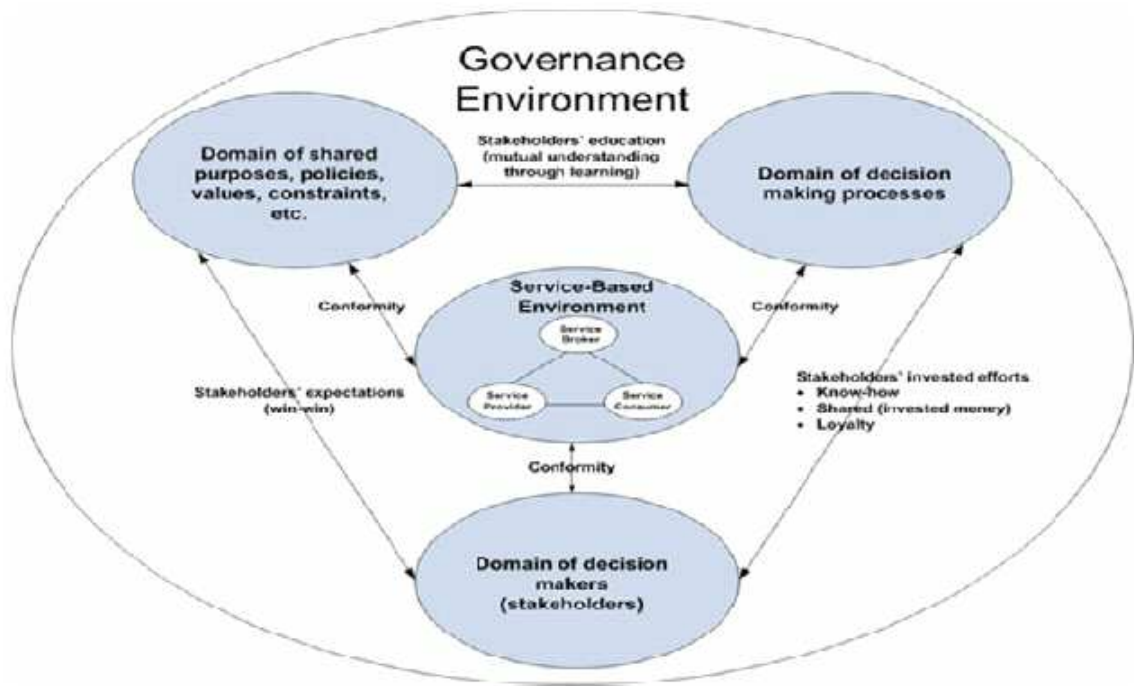
*“SOA is the glue between the business and the IT-systems, which provide the possibility to optimize the business-processes. An order-process can for example increase the speed with several percentages. Traditionally have they been forced to hire both business-skilled and system-developers in expensive and time-consuming projects to be able to manage this. Often have they also been afraid of changing applications where the business-process is involved.”*

In this voice regarding SOA, there is one particular factor pointed out to benefit the business. Marks and Bell (2006) discuss some others, such as software reuse, avoidance of redundancies, extended capabilities of existing IT-systems, which increase the return-on-assets and IT productivity, as well as made the IT-organization more business-oriented and more focused on forward-looking strategic issues. Van den Berg, Bieberstein and van Ommeron (2007) investigated the purpose for implementing SOA in several organizations and found the following purposes: (1) increased flexibility, (2) decreased costs, (3) increased availability and reliability, (4) increased income, (5) new product development and (6) increased overview.

The SOA presentation is structured according to a master thesis by Kanchanavipu (2008), and not from published scientific literature (e.g. Marks & Bell, 2006, Erl, 2009). The reason is that the scientific literature is more technically oriented, and lacks the overall model for what a SOA is. This is provided by Kanchanavipu in a comprehensive and combined model regarding governance of a SOA with a business perspective, see figure 2.

### 2.3.1 SOA domain model

Figure 2 shows a SOA governance domain model from a business perspective, with the governance environment as the wider circle and a model for the service-based environment as its foundation (Kanchanavipu, 2008). Both of these environments will be described in detail below, beginning with the governance environment.



**Figure 2 SOA Governance Environment (Kanchanavipu, 2008)**

The wider circle of a SOA domain model consists of three different domains: (1) domain of a decision making process, (2) domain of shared purposes, policies, values and constraints and (3) domain of decision makers (figure 2).

### 2.3.2 Domain of shared purposes, policies, values, constraints, etc.

This domain consists of common values, documentation, purpose, boundaries and culture, all with the prefix service-oriented (Kanchanavipu, 2008). The goal with the domain is to create a mutual picture and understanding of what SOA is and how it is meant to be perceived within the organization.

According to Peppard (2007) six competences are needed in an organization, to be able to achieve benefits with IT-investments. These six competences are joined together, but the originating point is strategy formulation (Ward & Peppard, 2002). The strategy is the input to what IS-benefits and IT-possibilities can be achieved. Where the former gives how the information can be used, and the latter which IT-solutions to be pursued. These two parts show how the delivery of the IT-system should be. Within the six different competencies there is a different balance of knowledge. The technical competence is needed when choosing a system and the visionary competence is needed at the strategy formulation. A key factor of success is to coordinate among these competencies. The toughest task is to create the relations between the different competencies, as every individual base their competence on experience, nomenclature, and culture within their expertise. Cooperation and knowledge exchange is essential to reach the goal of an IT-investment, as the individuals do not have the possibility to learn each other's specialist know-how.

Common documents, or policies, can be seen as the operational view of SOA governance. It must therefore support the selected high level governance model, based on the business and technical requirements, defined standards, SOA goals and the nature of the services used internally and externally (Marks & Bell, 2006). There is a need for policies to cover the life time cycle of SOA, which means the design phase as well as the run-time phase. In the decision process, skills from both the IT and business organization are needed. The initial implementation of policies can be made by the SOA project team and be followed by new policies from the line organization or Enterprise Architecture. For policies to be more than a document in a folder, they have to be a

vital part of the SOA life-time-cycle process, regarding design, deployment, as well as run-time. To obtain conformance, both internal and external services need to be verified against the SOA policies. People involved also need to participate in communicating, educating or discussing the topic (Marks & Bell, 2006).

Policies needed for SOA can be divided into six different types: (1) enterprise policies, which include security policies, design best practice and standards, (2) business policies, i.e. SLAs, performance criteria and approval levels, (3) process policies will answer questions like who is allowed to publish a service and version management. (4), compliance policies for regulatory compliance standards and other industry standards, (5) technology standard policies and (6) security policies for the organization's security model, i.e. authorization. (Marks & Bell, 2006)

Limits are drawn within the organization's social structure, which give a distribution of tasks and decision rights. They also provide the formulation of rules and fixed routines which control and coordinate the work for the realization of the organizational goals. The structure can be more or less concrete, but is intended to give a certain regularity and predictability of the stakeholders' actions. This enables them to create patterns and act as a more coherent unit. (Svårdström, Magoulas & Pessi, 2006)

To complement the mutual picture of a SOA the culture of the organization can be described. Marks and Bell (2006) describe it in terms of alignment between the organizations' and the services' strategies and thus the governance permeate the organization. The dynamics or behavior of the organization to accept a service-orientation can be controlled through different types of incentives and through the context of the organization (Lanzara & Patriotta, 2007).

### **2.3.3 Domain of decision makers**

According to Nascio (2006) the organization must establish a SOA-management as soon as possible, as not to develop redundant services, or to perform unnecessarily expensive implementations. If the organization already has an established IT-management function this is a good foundation for the implementation of SOA governance according to Windley (2006). If the organization has had informal governance historically, it is required to change the routines for management of development and maintenance at the implementation of a SOA within the organization.

Biske (2008) also describes the need of a strong governance function, for the SOA-project not to fail. He means, even if the view on SOA can shift among experts the meaning of governance is almost coherent. SOA-governances encourage the organization to always model, supervise, map and take control of the distributed environment within the SOA. The purpose is to secure a pure SOA and not only a number of separate web-services.

When a decision is to be taken, different competences need to be involved, competences that must be able to evaluate the actual issue (Kanchanavipuu, 2008). The competences are appointed roles in the organization, e.g. CIO or CEO and have different relations in the organization. Other roles, which can be owners of the problems and have the authority to summon and use current resources, can be Enterprise architectures and process owners. The roles and their authority can be extended with the authority to take a decision of a third-order change. According to Tsouakas and Papoulias (2005) is this described as a relationship influencing the organization and its surroundings. This gives, even the external stakeholders can be involved as decision makers (Svårdström et al., 2006). Regardless of which roles that exist and what parts of the organization which are involved, a mutual picture of the goal must be created in the decision process (Checkland, 1999).

To explicitly describe a service-oriented approach the various roles will also be described, i.e. stakeholders and decision influencers. Some roles will need to be introduced internally (Bieberstein et al., 2006), e.g. service-responsible, SOA architect, integration specialist and service administrator.

### 2.3.4 Domain of decision making process

An important process is IT-governance and how this is to function within an organization (Xue, Ling & Boulton, 2008). The authors mean, the steps taken before the final decisions are too unspecified in the literature, where only the stakeholders of the final decisions are considered. It is to simplify a complex IT-investment decision process. By defining how IT-governance can work on all levels it is possible to identify a better alignment, and to show the potential risks the stakeholders in the project can spot with their experience.

The decision process in a service-oriented environment can include the social parts of the organization, where Soft System Methodology (SSM) by Checkland (1999) can be useful. The steps in SSM are meant to define the problem and give it a rich description and a root definition, i.e. the problem from the different stakeholder's perspective. When the root definition is produced it is important that all stakeholders involved have the same view on the concept value, which should be defined and documented alongside the measurements intended to be used.

From the root definition, decisions on a suitable level in the organization can be made and give a basis for activities needed for the implementation. Kotter (1996) means the group who will perform the activities has to be at a management level. This is due to, they have enough force to be able to follow the decision/change through, and have the ability to communicate with others within the organization regarding the visions and the progress.

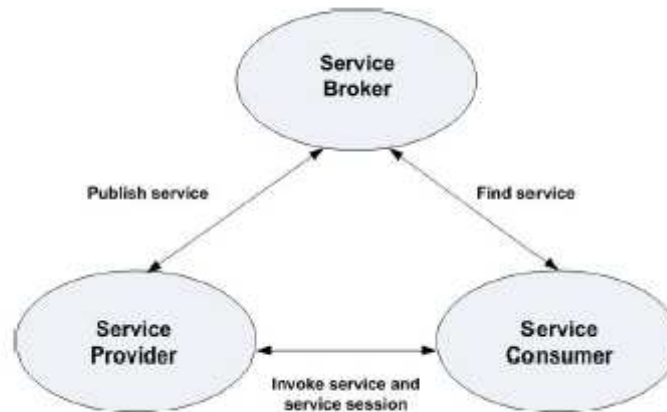
Access for all members in the organization to information is a condition which should be the only one. Unfortunately, this scenario is rarely achieved, since there is usually information politics involved regarding business information. Information politics are used to support somebody's own purposes and hierarchy, and therefore create different governance models described by Davenport, Eccles and Prusak (1992). Governance models which are differentiated by the strength of governance, and whether it is based on the IT-department's or the business definition of information. This can be described as a central decision process or a more distributed process (Kanchanavipu, 2008). The model is divided into: (1) *technocratic utopianism*, (2) *anarchy*, (3) *feudalism*, (4) *monarchy* and (5) *federalism*. (Davenport et al., 1992)

*Technocratic utopianism* is focused on technology and the IT-department is therefore, the main actor. Governance is completely based on new technologies and its functionality, i.e. this type does not take the business needs into consideration. Benefits in the model are, for example, low information redundancy, an extensive amount of information to access, and a technically good IT environment. The business needs are by no means fulfilled and the hierarchy is not interested in the information content, and what it affects. *Anarchy* governance model is lacking overall governance. This model creates space for the individual initiative, both regarding governance and the ability to access information. Without difficulties all co-workers can have access to organizational information and create necessary reports. From an organizational point of view anarchy gives low efficiency and non-standardized terminology. *Feudalism* means decentralized information governance for all departments. If the feudal model is practiced, cooperation between departments is done very reluctantly. Obviously information is perfectly well fitted to each business part, and no standardization is made. Information redundancy is high and accessibility low. In *monarchy* one person in the organization governs information and this gives effectiveness and standardized terminology. Disadvantages are information quality, arbitrary decision and low accessibility. The last governance model is *federalism*, which includes negotiations and will result in governance based on the report structure of the organization. Included in these negotiations are standardization of terms, adjustment to the organization and high information accessibility. Disadvantages with this governance model are mediocre information quality, and the time-consuming decision process.

### 2.3.5 Service-based environment

Within the domain service-based environment will two branches be presented of how a SOA is built to meet the demands for a service. The first is OASIS attribute model (MacKenzie, Laskey,

McCabe, Brown & Metz, 2006), the other shows Marks and Bell's (2006) nine categories. This choice is based on that the former is a support for analysis of the service attributes, i.e. supports the communication between the consumer and the provider at an operational level. The latter model is more focused on communication between the business management and the business operations, regarding the consequences for the operations if the demands are not met.



**Figure 3 Domains in a business-oriented SOA (Kanchanavipu, 2008)**

A service in the service-based environment includes three parts; (1) service provider, who publishes the service description and implementation of the service, (2) service consumer, who is the user of the service, (3) service broker, which has the service in its supply, see figure 3. The transactions are sent between the service provider and the service consumer. One task for the service provider is to create new services. (Kanchanavipu, 2008) The interactions between the three parts are fundamental concepts of a service and can be described as: (1) the relationship between the service provider and consumer (visibility), (2) interaction between the service provider and consumer (interaction), in the form of digital messages and (3) the added value which affects the interaction with the service (the real world effect) (MacKenzie et al., 2006).

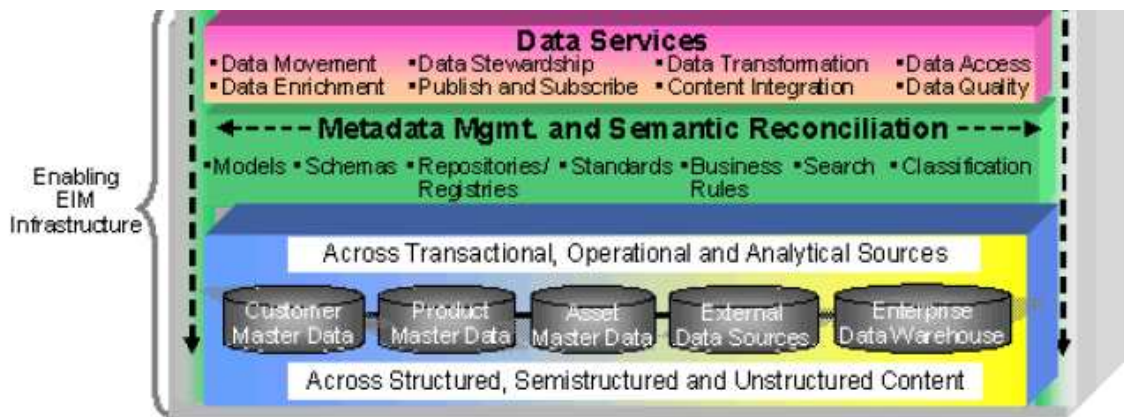
To explore deeper in the description of a service, the definitions from OASIS (MacKenzie et al., 2006) and Marks and Bell (2006) are given. The difference between the two theories is: OASIS gives a more technical view and Marks and Bell provide more business-oriented factors. OASIS (MacKenzie et al.) states that the following attributes for a service are needed: visibility, interaction (loose couplings), the real world effect, contract and policy, service description and an execution context. Marks and Bell (2006) give their view of SOA characteristics as nine different criteria: (1) coarse-grained, which means the service can solve the business problem, can be reused and technically implemented, (2) well-defined service contracts which inform consumers what the service does as well as how to use it, (3) loose couplings so a service can be replaced, modified and evolve over time without disrupting the consumer, (4) searchable for the service consumer through a service registry, metadata repository or other location, (5) durable for existing business processes, (6) is composable, i.e. making each service self-contained and replaceable, (7) business aligned, which means it deviates from business imperatives and business requirements, (8) reusable with a clear definition across and within the business processes in the form of requirement documentation and metadata, and (9) interoperable with e.g. other services or modules.

### 2.3.6 Technical layers in a SOA

The technical layer in a SOA integration can be described as the Enterprise Information Management (EIM) (Newman & Friedman, 2005). In figure 4 the enabling layer is shown, and it will represent this study's technical description of SOA.



The data services formalize the standardization and deliver data. This layer improves the possibility to coordinate usage of disparate and overlapping technologies. More fundamental in EIM is metadata management, where reuse of code, data and interfaces bring redundancy as low as possible. Metadata storage gives the organization possibilities to understand relationships, e.g. which components are invoked by the service or which business processes use the components. The storage of different types of non-transactional data, master data, transactional data, usage of external data sources and the combination of these in the enterprise data ware-house, form the base in EIM (Newman & Friedman, 2005).



**Figure 4 Data Integration Capabilities for SOA Environments (Newman & Friedman, 2005)**

### 2.3.7 Service-oriented architecture and business levels

Meta, macro- and micro levels are used for communication to actors within the organization, and thus the level of details is different within the three levels. For each level, the business goals with their information systems and implementation are set. Besides different target groups for communication is time another factor, which differentiates between the levels. Communication is important in order to cultivate and define the concepts intended to be used (Malan & Bredemeyer, 2004) and give them their correct meaning (Bannister & Remenyi, 2003).

Meta level is used for two purposes: (1) to create a vocabulary in which the reference environment can be discussed and (2) to show the organization an ideal information-system-environment (Hoffman, 1988). The requirements for the meta architecture means they should be realistic, understandable, follow decided standards, describe the organization and make sense.

Hoffman means, the goal for the macro level is to describe the strategic and tactical plans to achieve the business' goals by using information technology. These plans can continue over an undecided length of time. This reference-environment can give the business a goal when they prioritize resources and tactical plans. The actors, to whom the macro level will be communicated, are non-technical managers and co-workers. At the macro level, the relationship between the business vision and the information systems' implementation is described, on a high conceptual level to reach the receiver correctly.

Micro is described at an operational level, which consists of guidelines on a detailed level. Time perspective, which is used for the micro architecture, is short and the description of the business vision is not explained. The micro level is based upon the outline which is a part of the macro level (Hoffman, 1988).

### **2.3.8 Implementing SOA in an organization**

The first step needed to be taken when building a new service-oriented environment is to identify the different components involved in a business process (Kanchanavipuu, 2008). These components can be co-workers, technology and other resources needed to give the process business value. In order to be able to discuss and understand each other, common and structured descriptions of all the different layers are needed.

The business has the largest benefit of the services where alignment between the technology and the business exist. This interoperability is created with loose couplings between the services, and their providers and consumers. One way of reaching agility between technology and business is to have process owners or leaders who are the initiator of changes (Xue et al., 2008). Agility, which can be created with the usage of service, is of benefit for the business when changes are needed in the processes.

The beginning of a service implementation in the organization needs to be an iterative process with incremental steps (Marks & Bell, 2006; Bieberstein et al., 2006). With iterations of SOA business, SOA strategy, SOA project and SOA services as the four main steps (Marks & Bell, 2006). The governance of the service implementation will begin with a top-down view for high level analysis of strategies. This is followed by a bottom-up perspective for operational input on the implementation, and continuing with incremental steps. Models as GAOs EAMMF (2003) or Bieberstein et al. (2006) steps can be used as support, where both a top-down perspective is available, as well as a more operational view.

The business initiative is the base for the services that shall begin the implementation, no matter if it's a service for internal or external use in the organization. The value for the business operation is defined by using the SOA value model, containing key business imperatives, domain and process focus as well as the business focus. Next step is the business service identification where existing services are analyzed, the service candidate project is estimated and a concern and core analysis is performed. In the last step the service is modeled, which means the design is produced, and the reuse and granularity analysis is completed. (Marks & Bell, 2006)

SOA implementation, as well as any other change of processes, can be a success or a failure. It is essential with a regular communication to all members in the change project and their stakeholders to be able to reach success (Kotter, 1996; Plank & Eneroth, 2008). The communication has to include small goals which have been reached, and what the next steps are. We always like to be winners as human beings! An achieved result, both positive and negative, has to be signed to different individuals in the form of a deal. Progress is to be measured and this can be done with plans, including clear and measurable partial goals. All team members need to contribute in planning and also at the decision-making of these goals.

A change process brings the management new challenges, i.e. both act as manager and leader. Manager in a top-down perspective and leader in the meaning of having both top-down and bottom-up perspective. Time is also an essential part in the change process, and both the long and short perspectives have to be considered. Other factors to consider are the objective and subjective parts of an organizational system. The objective perspective can be seen as structures, results and levels of individual performance. The subjective perspective can be seen as maturity levels in an individual or cooperative view. The greatest challenge for the management will be to deal with the contradicting expectations from higher management, stakeholders, co-workers, customers, colleagues and yourself (Plank & Eneroth, 2008).

### **2.3.9 SOA risks**

The collaboration between IT-management and company management, in order to strategically manage alignment for IT-strategy and organizational strategy, has been proven as one of the risks

with SOA (Bradley, 2011). The governance needs to work both strategically and practically together, to keep the SOA implementation on track, and make it a life-time SOA.

Often, one of the goals with SOA is to increase the speed to market for business initiatives and be adjusted for the preferred market. Due to this, the business needs to have the primary imperatives of the SOA initiative in place (Marks & Bell, 2006). These imperatives need to be extended into the IT-organization, and be a part of the focus in the business aspects of IT, as well as create a linkage between them. The personnel within both the business and IT need to have SOA skills. They also need an understanding of each other's department and what can be produced on each side.

Newman and Friedman (2005) see the discipline towards data redundancy, linguistic inconsistency and inconsistent data storage as a risk. Since SOA consists of loosely coupled integrations, different sources and inconsistent linguistic can create a threat for achieving reuse and efficiency. Ways to mitigate these risks are to provide governance and appliance of methods for connections with other data storages, rules for linguistic, as well as a common understanding how to profile and ensure data quality. These risks can be explained as the understanding of the difference between commonly used distributed architecture and SOA architecture, which needs to be fully understood (Erl, 2009).

To create agility Börjesson (2006) means that the implementation project should have few members. Agility is created, by having fewer stakeholders needed to take into consideration, and having smaller interacting groups. This, together with a sense-of-urgency creates a higher implementation success. Further, Börjesson shows that ambassadors of the project need to be change artists, who know how to facilitate change, knowing when and where, and also be aware of who can manage change.

## **2.4 Business development and business processes**

When developing a service, the different business processes will form the foundation of the service. A process can be defined as having a starting and an end point, contain repetitive activities, the map of a flow in the organization, have a purpose and goal, as well as being measurable (Sörqvist, 2004). The measure can be designed to give a good estimation of the capability and stability of the process, i.e. meet set targets and demands and only possess random variations. Other aspects on a process are; there ought to be a process-owner tied to it who has the necessary authorities, as well as a definition of the consumer and provider concept. In other words a process and its description can answer the following questions: what, how and why it will be performed (Sörqvist, 2004).

Within business development it is spoken of methods for incremental and radical business-development (Sörqvist, 2004). The difference between these two is the scope of the degree of change. An incremental change is a business improvement in an already established process, while radical business-development can be so extensive that a new business-process is created. It is not unusual for radical business-development to arise through strategic choices on a management level. It can be a new business direction, which forms other requirements on the business-processes or drastic measures for survival due to external forces – a direction that set other or further demands through the entire organization (management, personnel, technology and organizational structure) (Kettinger 1997). The business' relation to its environment controls which method should be used at the business development (Sörqvist). Henderson and Clark (1990) imply, running an incremental business development can lead to less interference on the current business, from both a financial as well as a human capital aspect, as the personnel can manage smaller changes easier, and be supported with fewer resources.

Another perspective on degrees of change is their limitations, which Sörqvist (2004) presents as a first, second or third degree of change. The first degree is a locally defined change, which can be

an activity, function or workgroup within a business-unit. In practice it can be an initiative from the group itself, to make a smaller improvement in the group's business-process.

*"Improvements of the first order means improvements within a current system or thinking /.../. Improvements of the second order constitutes of more innovative and dramatic changes where the system and/or thinking are changed at the foundation."*  
(Sörqvist 2004:74)

When changes occur, which affect not only a single group but also other close units (functional – cross-functional or sections – cross-sectional), a second degree of change arises. When establishing a business process a number of formations will usually be affected in one way or another within an organization. The third degree of change or innovative problem solutions, include relationships between the business and its surroundings, e.g. interactive relationships and alliances. In some cases this effect is dependent on events arising beyond an organization's influence, but the organization must relate to. (Sörqvist, 2004)

Kettinger (1997) means the initiative for new processes need to originate from the business. To use the specific competence as IT-personnel have within project management, pure IT-competence and thus be able to create prototypes for an agile way of working in a business-project, is to take advantage of available resources. Kettinger believes the analytical ability of IT-personnel is an asset at scenario-development and this ability should be exploited.

## 2.5 Actor-network theory

Actor-network theory (ANT) is a theory which supports studying and explaining different events, regarding the origin of larger communities (networks), as well as the actors' relationships within a network (Latour, 1998). There are two branches within ANT, where this theoretical framework and study are foremost based on the sociologic and philosophic branch with Bruno Latour in the lead. The net (or network) becomes the context where each action is created and where the connection between technology and humanity is established. ANT shows, all actions are linked together in a net and support further studies into a certain situation and more comprehensively through its flexibility.

An ANT net consists of the relations between one or more actors, which can be both technical and non-technical elements, with their possibilities and limitations (Monteiro, 2001). An actor can be a person, profession, document or organization, as well as the technology which is used. At first the actor is called actant and after becoming a stable character it is called an actor (Czarniawska & Hernes, 2005). Every actor in the net affects it and vice versa.

Two concepts are of significance in ANT, according to Monteiro (2001); inscription and translation. Inscription means the created artifact contains more than what the written documentation describes. It contains an inscription about how future usage of the element (or actor) is expected to be performed, i.e. rules and routines. Usual characteristics of inscription are standardization, material to publish the inscription and therewith give the inscription strength. For the actor to pass on the purpose with the net, the net needs to grow and thus obtain a higher status (Latour, 1998). The growth can be done through an alliance with other nets or through conviction (enlistment) of other actors within the net. For a net to grow it needs a mobilization in the form of an action-plan, to make the spokespersons able to enlist new members.

Translation is the design created to meet the expectations of the users' needs, which are intended to meet the idea about the users' competence and their role (Monteiro, 2001). Czarniawska and Hernes (2005) divides the translation into four sub processes: problematisation, interessement, enrolment and mobilization. All the sub-processes have the purpose of strengthening the initiators' or founders' specific interests. Problematisation is the first step in building a net, where the initiators want to produce their view of defined problems, solutions and establishment of roles

in the network. Interessement includes strategies and mechanisms where initiators try to keep control of the net, including locking new allies into place. Enrolment is a strategy in which the initiators try to convince other actors to join them in a multilateral process. Mobilization is another method where the initiators ensure the allied spokespersons represent their constituents properly and do not betray the initiator's interests (Holmström & Robey, 2005). Initiators make social changes possible through translation and inscription with other actors and by enrolling them in the change effort (Monteiro, 2001). By the inscription, the initiators take control and make the actor network stable (Latour, 1998).

When an actor initiates a new net based on the problematisation, it is perceived as a micro-net. The difference between a macro- and a micro-net is the number of actors included in the net, where the macro-net has a larger number of actors (Latour, 1998). In a micro-net the interconnecting points between the actors are more complex, i.e. it is possible to consider more factors for why the net exists. When alliance or mobilization spreads the purpose of the net, the number of actors will increase and thus the net becomes a macro-net. A simple symbol or totem is needed for a macro-net to stay together, this means a macro-net becomes less complex to study as the number of interconnecting points are few (Latour, 1998). The complexity can also be explained by the concept Blackbox, which refers to the blackbox in an aircraft. The blackbox contains the issues which will not be studied. Why the issues will not be studied may have several reasons, e.g. the scope of the study, the hypothesis implies that all is not relevant, or there is a lack of knowledge so it becomes an unconscious limitation (Latour, 1998). An important component in ANT is to create interfaces between different nets. When a net creates an interface the transmitting net can be seen as a blackbox for the receiving net, i.e. the other net can use the information, but the responsibility is transferred via the interface. Monteiro's (2001) ANT study describes, it can be easier to create interfaces between different networks, rather than making one, and thereby a bigger network. Interfaces reduce the complexity and the risk for a certain act by coincident can be spread far and too many (Weill & Broadbent, 1998). Several and smaller networks give the possibility to overview and control effects during development.

When using ANT for studying a phenomenon or event, the concept power needs to be described. Where Latour (1998) means "Nothing is more important than anyone/anything at the start of a study". It is only at the end of a study you will know what was important, the theory can thus not support predictions of trends or which actors that will "win" (Latour 1998; Czarniawska & Hernes, 2005). The winner in this context can be translated as a stable, inextricable and largest macro-net, where the competing micro-nets have been incorporated or extinct.

Another important ingredient in ANT, which Latour (1998) stresses, is evidence, if a net is to be sustainable and stable. There must be evidence to be able to translate and transfer from the preacher to the recipient without being questioned. Otherwise the truth will be a rumor or myth, or the truth can be distorted. To be able to create evidence within an ANT, different angles of the procedures are needed. Only one perspective of the problematisation can give the wrong result. Multiple perspectives give according to Latour more dynamics and a more secure result.

## **2.6 Benefits management**

Before a decision regarding an IT-investment is to be carried out it is important to understand what benefits are expected, these benefits must therefore not only be cost assessed, but also evaluated based on the expected benefit (Bannister & Remenyi., 2003; Cronk & Fitzgerald., 1999). One method of evaluating benefits is, for example, PENG (PENG, 2010) which from a communicational view is good (Bannister & Remenyi, 2003). To create a more visual view on qualitative versus financial benefit are for example the benefit map, followed by the benefit-matrix (Lundberg, 2009) or Impact Diagram Map (Gulati, 2002) suitable models. They are suitable as they give the frame for the resource needed for implementation of change, as well as where in the organization the benefit is expected to arise.

Ward and Peppard (2002) state a key for a profitable IT-investment is to solve the problem or correct the process, which is confirmed by Carr (2003) who means, one reason for not being moderate with IT investments is the overwhelming belief IT will solve the problem. It is not only the IT-investments which need to be analyzed, knowledge and management at the IT department also need to be aligned with the business, in order to gain most of the IT investments. Ward and Peppard, Carr and Ward and Daniel (2006) indicate all IT and IS must be aligned with the company processes, which the company wants to develop or implement to achieve the most value for money.

### **2.6.1 Benefits management model**

Traditionally a business case within an organization has been produced to estimate and obtain finances for a project. This is changing and a business case is today more focused on business change and benefit, which can be hard to value financially (Ward & Daniel, 2006). In this study will Ward & Daniels Benefits Management (BM) represent the evaluation models, as it focuses on realization of benefits, support evaluations, as well as implementation and follow-up of an IS/IT-project.

The work with the BM model originates from the business strategy (Ward & Daniel, 2006). It is only after these strategies are established, an organization can identify within which areas a change or investment will provide benefits, these are presented in the form of strategical and organisational drivers. The drivers are defined as internal or external, based on these the investment goals will be set. The drivers and investment goals will be the foundation of what is Ward & Daniels main tool in the BM – The Benefit Dependency Network (BDN), see figure 5.

After the investment goals are agreed upon the mutual dependencies with the business benefits must be identified and described and plotted in the BDN. The description and plotting should be performed in an actor perspective. To get a measurable benefit it is good to know which sort of benefit which is intended to be achieved. Ward & Daniel (2006) divide these measurements into four groups: financially measurable, quantifiable, measurable or observable.

The benefits may then be categorized in consideration of the investment goals. These categories will be the foundation in the analysis to identify which permanent business changes are necessary to be implemented, in order to realize the benefits, and which temporary changes are demanded of the organization. Finally these necessary IS/IT investments/changes will be connected to primarily the temporary business changes to secure the expected effects will be realized.

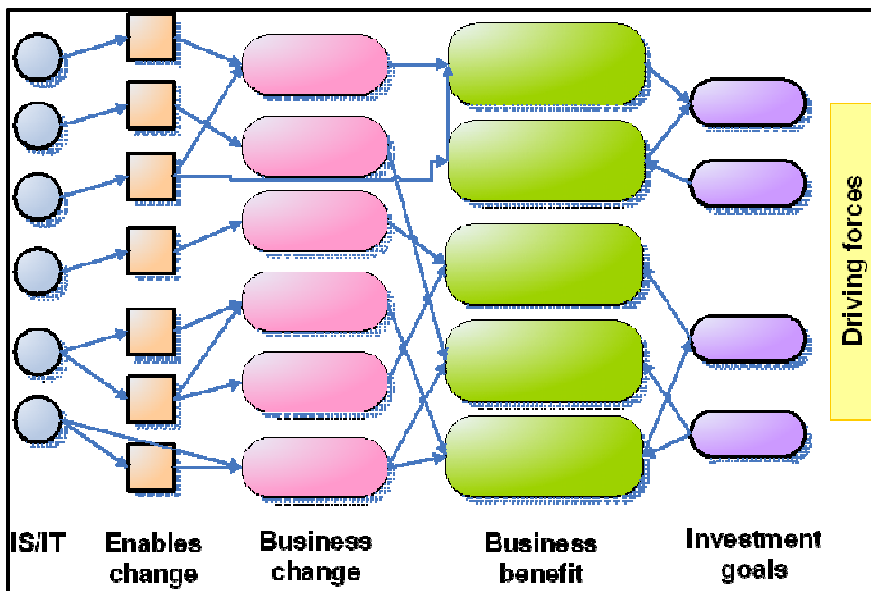


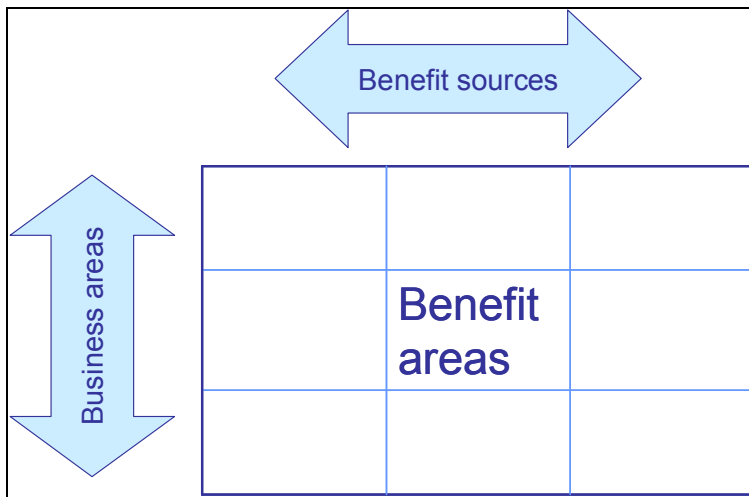
Figure 5 The benefit dependency network (Ward & Daniel, 2006)

One important ingredient in the BM and BDN to secure the benefits will be realized, is to appoint change owners with responsibility and authority to realize the changes and benefits from the investment in the organization. Together with the BDN these change owners will build a good platform for iteratively follow the investment during the entire project, its implications and to perform follow-ups.

### 2.6.2 Benefit-map

Before a project starts or an IT-investment is approved, the organization needs to know within which areas benefits can be obtained (Lundberg, 2009). A benefit-map is a good help, as it can be used on both an overall and a detailed level. Overall only “+” or “-“ should be presented. The next step is to verbally describe the expected benefits. This is mostly for the project members and for communication with those who have insight in the project, a short description is therefore enough. To keep the business benefit in focus, the following competences must be represented in the activity: business competence, competence regarding the IT-investment and IT-visionary competence (Lundberg).

The map or rather the matrix consist of on one side business areas and the other benefit sources, see figure 6. The business areas need to describe the situation with general concepts, e.g. customer management. The benefit sources are the overall goals. These can be defined according to the situation or can be held more general, e.g. create new business.



**Figure 6 Benefit-map (Lundberg, 2009)**

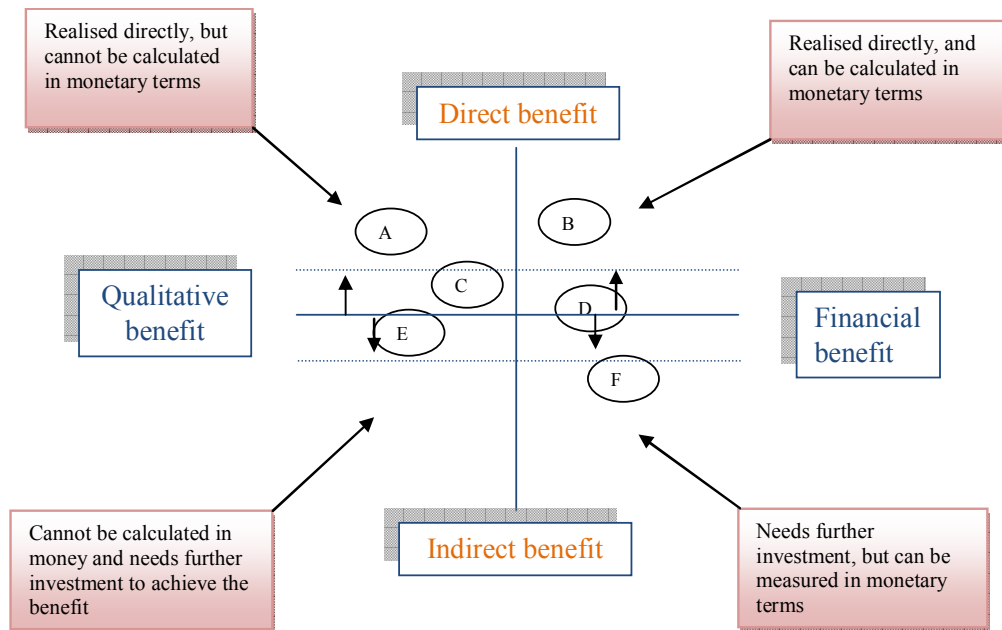
At the completion of the benefit-map the benefit areas are to be listed, where each area is examined with the following question: How can each benefit source lead to increased business benefit within each business area? It is important to list and clearly describe what each positive and negative benefit-effect will be, as to make the map relevant.

### 2.6.3 Benefit-matrix

After the benefits from the benefit-map are listed the scope what an investment in business change and IT must be described. Lundbergs (2009) benefit-matrix helps to present, through four different dimensions, how the benefit could be achieved within the project and what effect it is expected to give, see figure 7.

To be able to see the correlation between the benefit and the finances, the listed benefits must be analyzed and placed in the benefit map. First, each benefit must be analyzed in regards to if they will give a financial (decreased costs or increased revenues) or a qualitative benefit (soft values which hat can't be valued in money, e.g. less stress). The benefits will then be estimated as direct or indirect benefits, i.e. if the investment will be realized directly from the investment or further investments will be necessary. The horizontal line is not fixed, i.e. instead of moving the benefits, an increase or a decrease respectively in the scope or investment of the project effect the possibility to obtain more or less direct benefits. If the investment increases, as shown in figure 7, both the whole benefit D and E become direct benefits. It is important to clarify where the line between an indirect and a direct benefit is drawn as soon as possible, to know if the benefit is to be covered with the initial investment or if further investments are needed.



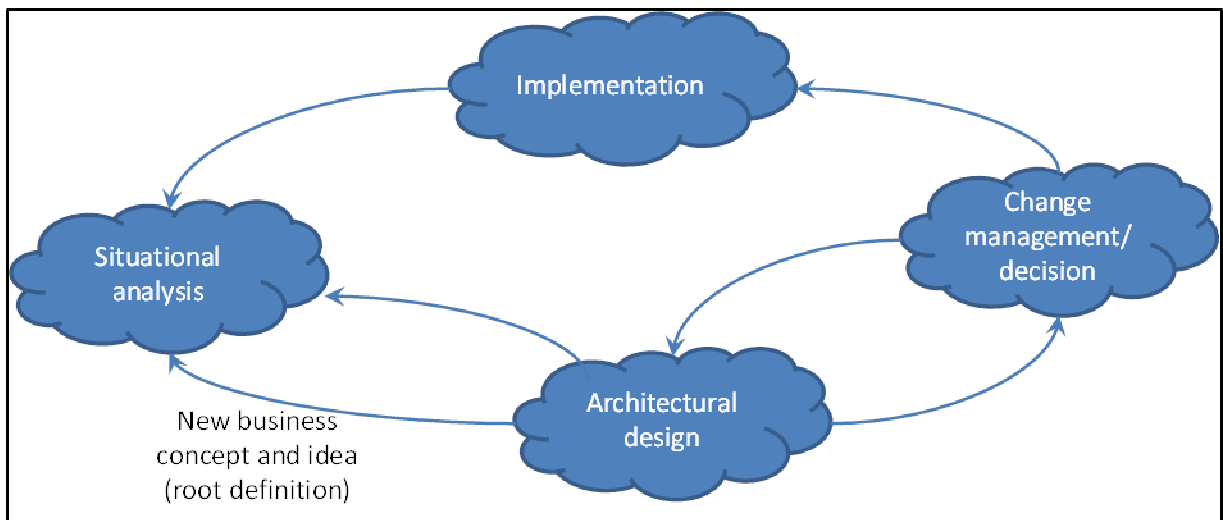


**Figure 7 Benefit-matrix (Lundberg, 2009)**

How you use and interpret the benefit-matrix differs between organizations and its present situation. All benefits will be assigned a value, it need though be expressed that the categorization is not static, but can be re-evaluated through studies or altered prerequisites. The indirect benefits can be handled, noted and saved until later or increase the investment as to implement these possibilities faster, see figure 7.

## 2.7 SACIS-model

SACIS is a model for coordination and proactive organizational development, and is meant to support the stakeholders understanding for continuous change (Johansson & Jerk., 2004). SACIS consists of four parts; see figure 8, where the starting point is Situational analysis. The intention of the starting point is learning and double-loop information flow (Burnes, 2004), and the steps in the model should be seen as iterative. The SACIS model is chosen from the numerous existing variants of project models, as it in a simple way presents the process from idea to follow-up after the actual implementation.



**Figure 8 SACIS model and its relations (Johansson & Jerk, 2004)**

SACIS contains four parts and five steps:

- **Situational analysis:** the goal with this first step is to find the root definition (business concept) which is the foundation for the problem and the issues needed to be acted upon. First an identification of the present situation must be analyzed and described, as to identify the affected stakeholders and thus who need to participate in the change process. The future work and the root definition have to be based on the organizational strategy developments. The proposed root definition (business concept) will be the future picture (vision).
- **Architectural design:** the root definition is the foundation for the design, if the picture is unclear an iterative process between step 1 and the design must take place (double-loop learning (Burnes, 2004)). The result of this step will be an architectural design, based upon the stakeholder's expectations and goals. Johansson and Jerk means, others outside the organization should manage this step, as internal stakeholders may have difficulties making an objective assessment for changes and solution possibilities. This step must not be time consuming since environmental changes are quick, and the design solution may be outdated.
- **Change management/decision:** the proposed design or designs are now to be compared with the current situation, as to make an estimate if it would give the expected benefits from the root definition or generate benefits for the organization. If the stakeholders or decision makers don't perceive the design to be satisfactorily enough, the process have to be iterated to the design or even the situational analysis. Before the decision for implementation is taken the consequences of the design must be reviewed, i.e. prepare for a smoother implementation, since it may affect ownership, personnel, IT-infrastructure etc.
- **Implementation:** in this step the actual changes or development will be carried out in the organization. The implementation is usually performed as a project, and can, at major changes affect the entire project portfolio, as the design may have implications on already planned changes. Johansson and Jerk points out if a sustainable strategy, regarding the situational analysis and the architectural design, are done properly from the beginning the implementation phase will be easier to conduct.
- **Situational analysis:** a new situational analysis completes the circle, and includes the follow-up of the implementation and the fulfillment of the root definition. This follow-up can lead to a new situational analysis and thus a new SACIS process.

## 3 Method

This master thesis is performed as a qualitative study in cooperation with a science project at the Viktoria Institute in Gothenburg. The main part of the empirical base comes from Trafikverket in Borlänge. The method chapter describes the research context, scientific approach of the thesis and reflection upon the study's method, which concludes this chapter.

### 3.1 Research context

Trafikverket (TV), which 1<sup>st</sup> of April 2010 was established when merging Banverket, Vägverket and SIKÅ, has contributed to a large extent to this study's empirical base. The organization is a state agency, and among other things is responsible for the long-term infrastructural plans of building, operating and maintaining the railroads in Sweden. These conditions will create transport possibilities for the individual citizen as well as the Swedish industry, in consideration to the environment and health. TV is also responsible for crises management, which means to prevent crises within the transport system, as well as managing and communicating when they occur. Another task is to coordinate intelligent transport systems. (Trafikverket, 2010<sup>1</sup>)

The number of employees is 6.500, distributed among seven offices. The turnover for railroads is close to nine billions SEK for the last nine months of 2010.

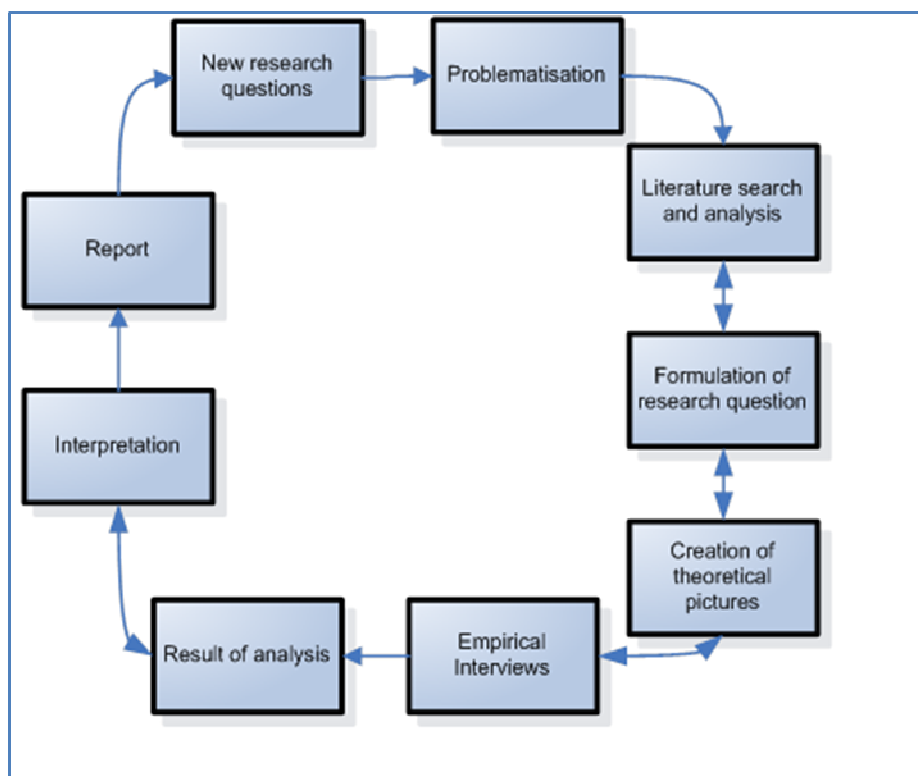
### 3.2 Scientific approach

Research is mainly performed with either of two different research methods, qualitative or quantitative (Berg, 2009). The main difference that qualitative research refers is to understand meanings, concepts, characteristics or metaphors. The quantitative on the other hand creates measurements and compares these measures in order to answer the research question. This study's research question and sub question seek to connect the decision levels within an organization with a technical IT-implementation. Based on these foundations Berg's (2009, p. 8) description of qualitative research method is applicable:

*“Qualitative research properly seeks to answer questions by examining various social settings and the individuals who inhabit these settings.”*

A reflection regarding the research question and its connection between technical and human behavior are knowledge, experience and attitudes, which have to be interpreted in a research process. This is performed in an interpreting qualitative process, called a hermeneutical research process (Backman, 1998). The hermeneutical research method includes collecting and interpreting the empirical foundation, and thus need to be relevant in its sample size. Such an attempt means the individual parts of the empirical material can't be interpreted without the wholeness and the wholeness can't be understood without the individual parts (Alvesson & Sköldbërg, 2009). The interpretation of the empirical base was performed as a comparison with the theoretical base, which was developed in the research process, i.e. an inductive approach (Backman, 1998). The scientific approach of this thesis can be described as a qualitative research method, with a hermeneutical research process and an inductive approach, see figure 9. A qualitative method has been used, as the study's attempt is to interpret the semi-structured interview-answers. This would a quantitative method not been able to bring. The qualitative method also admitted that the writers' industry knowledge could be used at interviews and analysis.

The study's reference-technique is carried out according to Backman (1998), in text and in the reference-list presented at the end of the thesis. For the body text the writes consciously have balanced between creating a high readability and the referral to the source. The readability is intended to make the text flow, as well as giving credit to the authors of the used literature.



**Figure 9 The writers' interpretation of Backman's research circle (drawn by the writers, 2010)**

Visualizing a research process is to simplify it, as it does not show all the incremental steps which are conducted (Backman, 1998). Nevertheless visualization gives clarity to the steps included in the process and their interdependence.

### 3.2.1 Data collection and analysis

#### Literature review

The qualitative research process involves a literature study in multiple steps, which has been performed in this study (Backman, 1998). Research for the below mentioned literature parts have been done at Google Scholar belonging to Google.se (Google, 2010) and Gartner (Gartner, 2010). Relevant search words have been used, e.g. SOA business. Further selections from the target list have been performed by reading the article's abstracts and thus deciding whether the suggested literature was relevant for this study. Other reviewed literature is literature used within the IT-management program at the IT-University in Gothenburg. The writers have also received material from Trafikverket concerning their SOA. The respondents from the academic sphere gave suggestions regarding literature within Actor Network Theory (ANT), and regarding the emergence of business models for services.

The following part describes in short the theory used for this study. To cover the principal theoretical concept **Service-Oriented Architecture**, literature collection was done within this area. The SOA concept proved to be more described in a technical perspective, and this study's focus is business oriented, which limited the literature sample. The SOA literature builds a theoretical understanding for SOA from a domain perspective. **Business processes** are described from a theoretical change perspective, and will form a new domain in the study's SOA-model. **Meta, macro and micro** are concepts used to describe different layers in the organization. The interrelated communication is also handled through these concepts. These layers are used to answer the research sub question, i.e. what the different levels need to address when

implementing a SOA. The **Benefit management model** is used to show different benefits and their values from idea to implementation. This supports the formulation of an answer, to how organizations at different levels can deal with benefit discussions at the emergence of services. To describe both the technical and human influence at an emergence from an actant to a stabile net is **Actor Network Theory (ANT)** (Latour, 1998) used. At the emergence to a stabile net are compromises of different kinds agreed upon and symbols created, which can unify the actors into a functional net. As a support to describe the emergence from a project perspective, is the project model SACIS used. This will give a picture of how situational analyses, architectural design, change management and implementation are performed and their relative position.

### **Empirical data**

The empirical material was gathered at four interview sets. The first set was performed at Trafikverket in Borlänge, with on-site interviews with employees who had different roles in the implementation of a new message broker. They had a more technical experience from the system and SOA. The second set of interviews was also carried out with employees from Trafikverket, but this time with a more business-oriented view of SOA. The third set of interviews included respondents who have knowledge in implementing SOA from a business perspective. These individuals belonged to different consultant companies with service implementation as their main industry. The fourth interview set was done with respondents belonging to the academy in Gothenburg. The purpose of these interviews was to increase the writers' understanding of theories, for example Actor Network Theory. Access to the first and second set of respondents was provided by Viktoria Institute's research project, as a part of the assignment which was the predecessor to this study. The third set of respondents was known to the writers and chosen due to their current positions and former experience within the area of the study. The fourth set included a mixture of respondents from the research project, and respondents known by the writers.

The interviews were semi-structured with different interlocking questions, depending on the answer from the respondent (Berg, 2009). Interview questions were prepared and divided into different sub themes before the different interview sets were performed. This was done in different workshops where the writers participated. The interview questions are presented in the Appendix. All interviews, except one, were done with the respondent present in person (the interview with respondent F was conducted over the telephone). The interviews were audibly recorded. The six first interviews were transcribed word by word, which was ordered from the Victoria Institute as a part of the assignment. From the remaining interviews were the answers summarized and noted in different digital documents.

<b>Role at the interview</b>	<b>Organization</b>	<b>Length of interview</b>	<b>Interview set</b>	<b>Respondent alias</b>
Development manager	Trafikverket	88	1	A
System administrator	Trafikverket	44	1	B
Project Manager, message-exchange system	Trafikverket	77	1	C
External consultant, user information message-exchange system	Trafikverket	55	1	D
IT-strategist	Trafikverket	58	1	E
Manager System Administrator Organization	Trafikverket	47	1	F
Ass. Marketing Manager	Trafikverket	49	2	G
PhD IT and logistics	TRB	140	3	H

Regional Manager Consultant Company	Ferrologic	77	3	I
Services manager and Salesman Services	Trafikverket	52	2	J,K
Integration Consultant and Implementation Consultant Services	Zystems by Enfo	90	3	L, M
Project Manager, Implementation Services	Zystems by Enfo	77	3	N
Doctoral Student Services	Centre for Business Systems	90	4	O
Professor, within Actor Network Theory	Gothenburg Research Institute	59	4	P

**Table 2 Overview of the interviewees in chronological order (drawn by the writers, 2010)**

The interview questions were based on the theoretical foundation formed in this study and in the precursor study in Arkitekturdesign (Architectural design). As a comparison can the two research questions be used, where the question in the Arkitekturdesign course is: “Which factors could be considered introducing service-oriented architecture?” This study has the following research question: “From a business perspective, which factors need to be addressed at an emergence of a Service-oriented Architecture?” The difference between these two questions is the perspective on service-oriented architecture, where the interview question in the first assignment was more technically oriented and this master thesis takes a business perspective.

The number of interviews is quite high for being an empirical foundation for a master thesis (Hart, 2008). The reasons for this are: (1) this study is using the interviews done at Trafikverket for the assignment in the course Arkitekturdesign, and (2) the area SOA from a business perspective has relatively limited theoretical material. The writers thus needed to increase the material, with business-oriented empirical material. Therefore were real examples, from businesses with a better progress in their usage of SOA, used.

### **Data analysis**

When analyzing the empirical material from the interviews, different categories and sub themes were used. The writers decided the categories from a summarized theoretical picture. The categories and their sub themes were used in the software Nvivo (Nvivo, 2010), the transcribed material from the interviews was imported into its database. The coding of the interviews was made in Nvivo by using the categories and their sub themes, e.g. the SOA domains (Kanchanavipu, 2008) and the decision levels. The result of the coded material was then used as the foundation for the presentation of the empirical material. Which material chosen to be presented in the empirical chapter was based on the codes, i.e. all voices were valued equally.

The foundation of the study’s structure was done in a summarized form, and put into a table. The first axis of the summary contained the chapter headlines: theory, summarized theories, empirics, and discussion. The other axis included the theoretical levels meta, macro and micro and the domains used in each of the levels. The written content in each cell were made at a summarized level and contained theory, empiric material and discussed analyses material. The work was performed during several workshops with the writers as participants.

### 3.3 Method discussion

To reflect upon the performed work is to increase the learning, and is a part of the research process (Backman, 1998). The writers have gained new knowledge and understanding within the following areas:

- (1) The design of a research study has to be clear and give a good foundation for progress and direction for the process (Berg, 2009). It is easy to forget this part, or not to discuss it properly. The consequences can lead to misunderstandings and discussions are held too late in the process. One example from this study is the coding in Nvivo, which started too early. Later the empirical discussions were messy, and it also meant only the base for the empirical result was used and all the available functions of the software program were not used.
- (2) This study can confirm Berg's (2009) opinion that semi-structured interviews on site were a good choice; this gave a better interaction with the respondents and offered them an opportunity to be the first to open discussions. It also gave the interviewer an opportunity to reflect upon body language. When offered to receive organizational material from the respondent during interviews, this should be handled at once. Otherwise time will be spent on reminding the respondent of the promised material.
- (3) The writers of the study have in vain tried to find a method for a structural overview of the collected material. With the amount of material a master thesis or a doctoral thesis will generate, an overall method which supports the structural work of the material would facilitate the work. Internet research, as well as discussions with researchers at the IT-university and at the Viktoria Institute regarding an overall method, has not been successful. The writers lack this overview and see it as an area for future research.

## 4 Theoretical framing

Describing the remaining part of the study from the single theoretical pictures would be to underestimate the complexity, and decrease the understanding for the continuing reasoning. As stated earlier the theoretical underpinnings of Service-Oriented Architecture (SOA) are from a business perspective not especially large, the merging of these theories will thus be a part of this study. The study's research question can't be answered with the theories individually, therefore these are summarized and developed together.

The chosen theoretical pictures will therefore be summarized into one model and used jointly. The theories, described in chapter 2, which will be merged are the SOA-model (Kanchanavipu, 2008), business processes and the different levels meta, macro and micro. This merger will be done in two steps. In the first step the business processes are assigned its own domain. The second step introduces the three levels meta, macro and micro into the model.

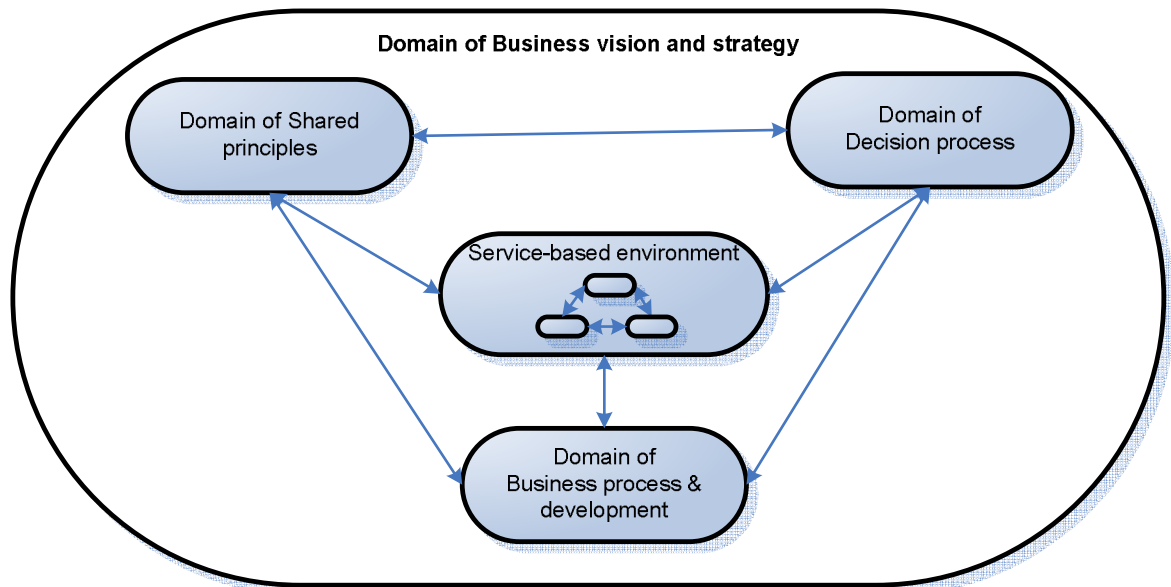
To clarify the links in the Actor-Network Theory (ANT) (Latour, 1998), a summary of this approach will be done, and therewith visualize the theory in order to clarify the included time-line. The actual time for the emergence of networks can differ significantly, but should be considered as a part of the emergence of macro-networks. To further exemplify the development of the networks are the concepts micro- and macro networks described in the visualization.

### 4.1 New SOA model step 1

In the theoretical picture the SOA-model by Kanchanavipu (2008) is used. This model has many strengths for explaining SOA from different perspectives. The model is for example a good starting-point for SOA, as SOA to a large extent means governance from a business perspective. In Kanchanavipu's study the focus has been to describe the SOA's decision makers and decision processes from a business perspective.

This thesis will focus on SOA from a business perspective and therefore four changes to Kanchanavipu's model will be introduced. The first change is that the governance environment will be seen as a domain, and will be titled the Domain for Business vision and strategy. The next change is to merge the two domains Decision makers and Decision processes into one joint domain. The third change includes creating a domain for business processes. The last adjustment is to change the title of the Domain of Shared purposes, policies, values and constraints etc. to Domain of Shared Principles, as to make the title easier to communicate, see figure 10.





**Figure 10 The writers' interpretation and development of the SOA governance model (drawn by the writers, 2010)**

The **first adjustment** means the Domain for Business vision and strategy is created. This domain will include the business mission, business vision and strategies. The purpose of this domain is to make the organization's overall strategies visible and describable in the model. In the study all levels within an organization will be described, which produces a need to add the overall domain.

The overall shared purpose is the business mission, where the uniqueness of the particular organizations should be reflected (David, 1989). To achieve a sense of purpose of the organization, the mission must be developed and communicated throughout the organization. The content can contain a description of customers, products of services, location, technology, public image and/or concern for employees.

Historically strategy is sprung as a concept for planning of warfare (Bengtsson & Skärvad, 2008). The concept strategy has over the years evolved and been incorporated through strategic planning within business organizations, where strategy is the art of using the organizational resources to reach the business goals. Johnson, Scholes and Whittington et al. (2009, page 22) define strategy as follows:

*"Strategy is the direction and scope of an organization over the long-term: which achieve advantages in a changing environment through its configuration of resources and competences with the aim of fulfilling stakeholder expectations."*

The strategic alignment model (SAM) (Henderson & Venkatraman, 1993) shows how the business- and IT-strategy are linked with the business processes and the IS-infrastructure. SAM can be used for understanding and communicating how business and IT are interlinked. A balance between the SAM-domains is needed to obtain alignment between IT and business operations and initiatives. Ward and Peppard (2002) also define strategy as: the ability to identify and evaluate the meaning of IT-based possibilities as an integrated part of the business strategy and to define the role of IS/IT within the organization. Johnson et al. (2009, page 22) state the strategic decisions are different at different levels:

*“Corporate-level strategy is concerned with an organization’s overall purpose and scope: business-level (or competitive) strategy with how to compete successfully in a market; and operational strategies with how resources, processes and people can effectively deliver corporate- and business-level strategies.”*

In the **second adjustment** are the domains of Decision processes and Decision makers merged into one domain. This is done as the study has given, either can’t exist without the other and the interaction between them is inseparable, see figure 10.

The **third adjustment** includes adding the Domain for Business processes (see figure 10), and will be described and explained below. The placement of the Domain for Business processes reflects the affect and the governing impact the content of the domain has. As described earlier in the theoretical pictures concerning the business processes will these be decided and controlled by the business (Kettinger, 1997). The effect on the development of the service and the implementation occurs through the relationship to the service-based environment and how the business process is governed with the help from the Domain of decision process and makers. In the Domain for shared principles the design of the business process will be affected by the organizational culture and governing documents (Kanchanavipu, 2008).

The business processes will be seen from the aspects described in the theoretical pictures, i.e. how can they change (incrementally or radically) and which limitations exist for these changes (internally within the department, internally within the organization, or between the organization and cooperative external organizations). (Sörqvist, 2004)

## 4.2 New SOA model step 2

The thesis’ research question will answer the sub-question: “What do different decision levels need to consider in the process of developing a SOA?” As a first step to discuss the topic the different levels meta, macro and micro will be introduced to the model. Marks and Bell (2006) describe that all levels are needed, from the view of implementation, development and maintenance of a service-platform. To visualize this, the new SOA model, figure 11, has been increased with the meta, macro and micro perspective and the respective domain levels concerned. The interpretation of this is that actions, of all kinds, are made throughout the organization regarding SOA. An overall description presents the meta-level as the governance level, with decisions affecting the whole organization for a longer period of time. The macro level is responsible for functions or processes and decisions affecting during a shorter time period (Hoffman, 1988). Micro level is where decisions are part of the daily business, the time horizon is thus shorter.

**The meta-level** describes the strategic frameworks within an organization, which are the overall frameworks a service-platform needs to answer to. This implies that from the business idea, with its description of what makes the organization unique (David, 1989; Hoffman, 1988), the business strategies are formed. The role of the IT-strategy is to support the business and its strategy, and should be aligned with this. For the development of a service-platform this means the meta-level takes a service-oriented view into consideration in its strategies and decides according to them (Marks & Bell, 2006). The time-perspective on the decisions and the communication created at the meta-level has the longest time span of the three levels.

**The macro-level** contains in the SOA-model the domains for Shared principles, Decision process and makers, and the Domain for the business processes, i.e. the relationship between the business vision and the implementation of the information systems (Hoffman, 1988). The content of these domains should be communicated to non-technical managers and co-workers at a reasonably high conceptual level.

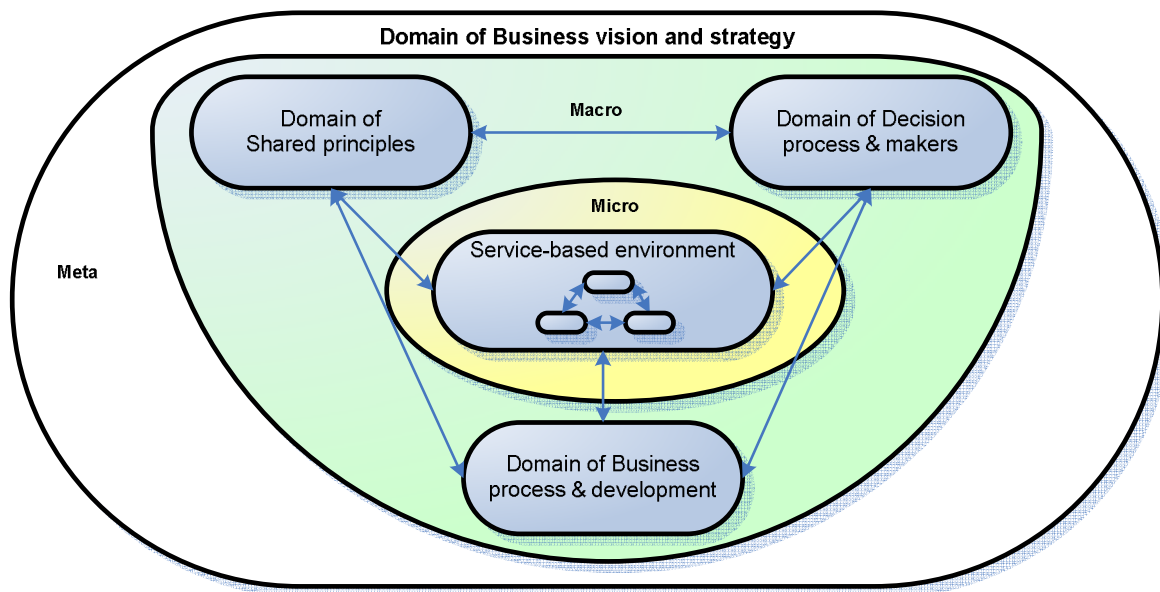
The domain for Shared principles contains policies, standards and target descriptions for the service-platform. Shared values are described in this domain, in the form of competence and competence-exchange within the organization. The organizational culture is initially described as responsibility and roles.

The domain for Decision process and makers contain; how the decision process is to proceed, and who can make the decisions (Davenport et al., 1992). This includes answering questions regarding who and why in connection to decisions, which concerns the relation between the business and IT.

The domain for Business processes presents the existing business processes and their definitions. Development and changing these can be done with an incremental or radical approach (Sörqvist, 2004). The limitation of the change and its influence on different parts of the internal organization or external influences are also included within this domain. This is referred to as first, second or third degree business-changes.

**The micro-level** contains the service-based environment with the actors: consumer, provider and broker. Transactions are sent between the service provider and service consumer, i.e. the role of a service provider is to create new services (Kanchanavipu, 2008).

The relationship between the different levels includes communication, mostly from the level closest above, and/or the level adjacent below (Hoffman, 1988). The content in the communication consists of the sending level's strategies and its explanations. The adjacent level below needs to give feedback on the result after the implementation of the investment.

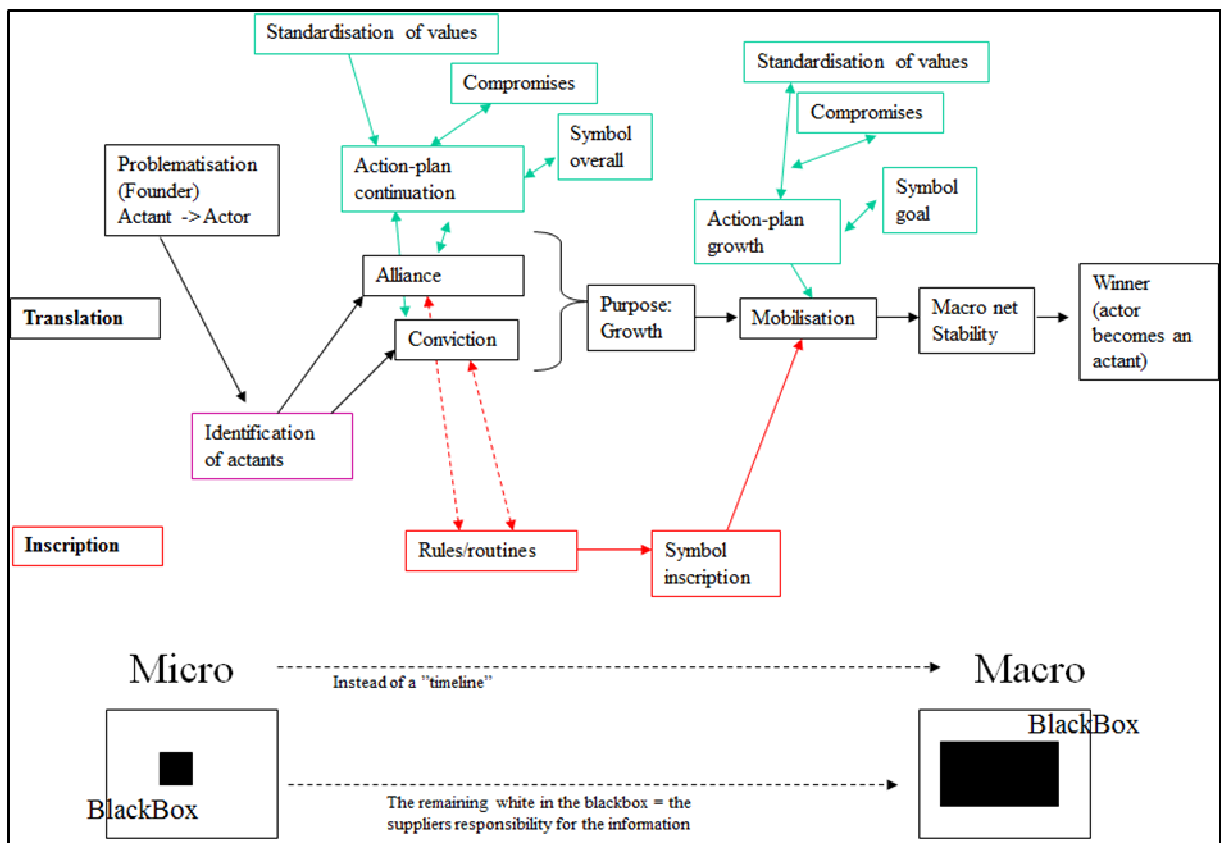


**Figure 11** The writers' interpretation and development of the SOA governance model (drawn by the writers, 2010)

### 4.3 Summary of actor-network theory

Actor-network theory (ANT) supports studies of events (Latour, 1998), figure 12 below illustrates how ANT is interpreted and used in this thesis. A network, or as Latour puts it, a net, starts with the formulation and statement of a problem by an actant (problematization), see figure 12. When this actant, also called initiator or founder, acts to solve the problem will the actant turn

into an actor. As a conclusion from this chapter, the decision levels meta, macro and micro will be merged with ANT into a visualization or picture (see figure 13).



**Figure 12 Visualization of the Actor-network theory as it is used in this thesis (drawn by the writers, 2010)**

The first task the actor (or initiator) needs to do in order to solve its problem, or as the theory explains it let the net grow, is to identify other actors who either can solve the problem or have the same problem (Latour, 1998). These actors or the initiator have two ways of letting the net grow and thus increase the possibility of influencing the surroundings to solve the problem. This can be done by either allying with other nets, or by conviction of other actors. When the net grows, the rules and routines interconnecting the net need to be developed and described, so the actors (spokespersons) know how they should act in order to reach the initiators purpose (Czarniawska & Hernes, 2005). The outcome of these rules and routines needs to be summarized into a symbol to give the net a common picture of the goal (vision).

The actors moving further with the vision need to jointly develop an action-plan for how they are to grow. If this is carried out through allying the net must standardize the values and compromise with the other prospective nets for specifying how they will jointly act as a macro-net. The action-plan also gives how the actors, or at this stage, spokespersons, who will be acting for growth are to enlist (convince) members. These action-plans have only one purpose, i.e. make the net larger. (Czarniawska & Hernes, 2005)

When it is time for the spokespersons to mobilize their strengths the action-plans need to be revised, as it can be the allied nets' compromised target that are to be reached. It is not only rules and routines which need to be described (Monteiro, 2001), when a net is to grow. An action-plan also needs to be developed for how the net will enlist members and what purpose of the net to communicate (Latour, 1998; Holmström & Robey, 2005). It is at this stage essential to keep the actors together under a common symbol, when the net moves towards a macro-net this symbol or

totem has to be simple (Latour, 1998). A net is considered a winner when it is extensive (number of members depends on the current context), and the net has reached stability. Stability also means the actor transfers into an actant again, i.e. it is no longer anyone who controls or pursues a change.

What figure 12 shows instead of a time-axis is micro versus macro, the actual time is not relevant as a net can grow in only a few days (e.g. the 17 year-old girls manifestation against the Swedish democrats at the 2010 Swedish election (Dawood, 2010)), or it can take 20 years (Canon vs. other camera providers (Latour, 1998)). The size of the blackbox also evolves when a micro-net moves towards a macro-net. In a micro-net a large variety of the actors' interests can be taken into consideration, as the net grows only a few common interests can be taken consideration of. The black in the BlackBox contains what is not studied or can't be studied without the study's scope becomes insurmountable, i.e. further delimitations need to be done as the net grows. (Latour, 1998)

### *ANT summarized with the decision levels meta, macro and micro*

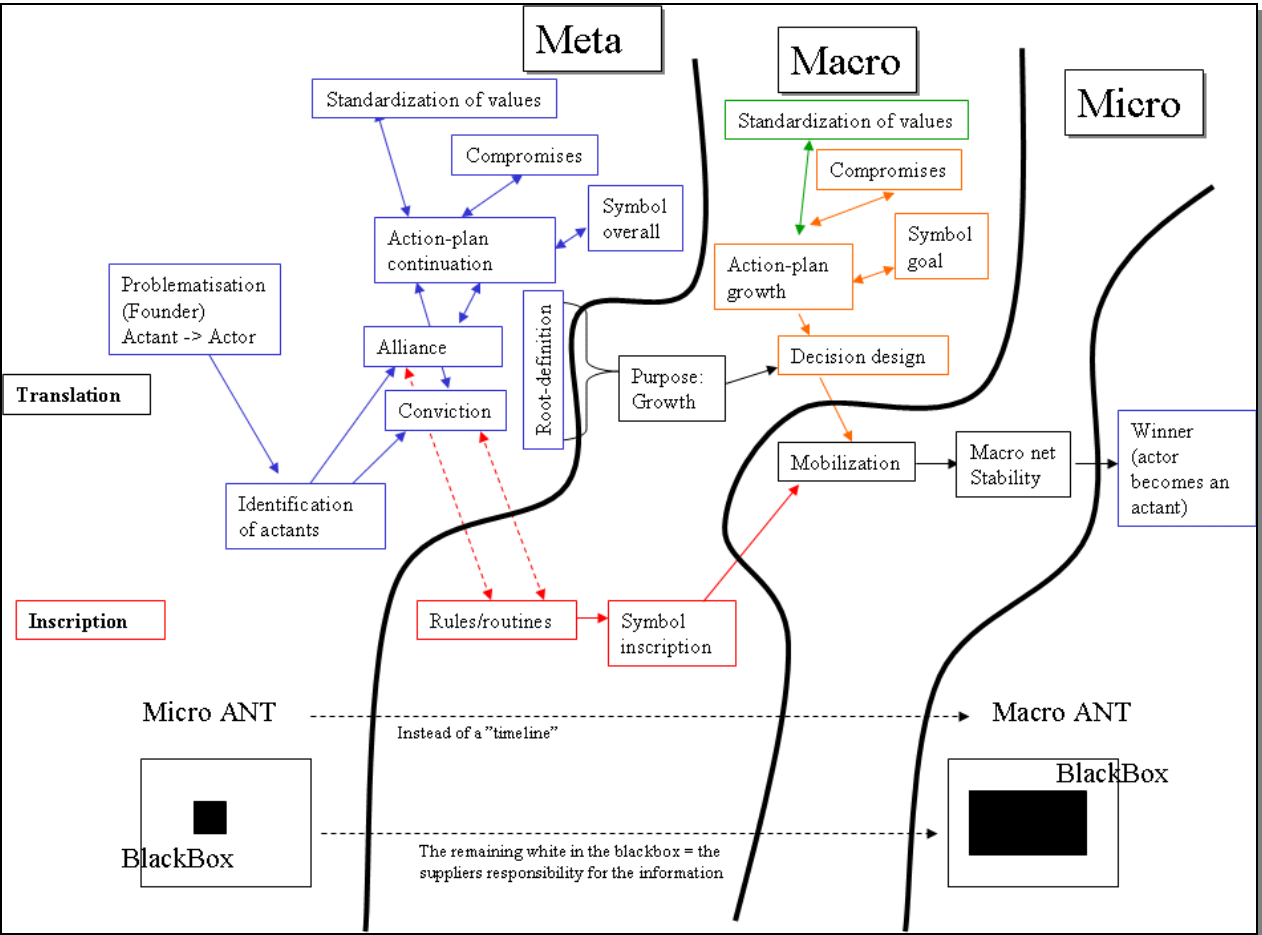
To answer the research question this study focuses on decision levels within an organization. The discussion will be carried out with the support of ANT. Thus the ANT visualization is merged with the decision-levels meta, macro and micro, as well as dividing the ANT activities into the SOA domains from the New SOA model, see figure 11.

The first activities are connected to the meta level, and thus the domain of Business vision and strategy. The meta-level includes the initial activities from the problematisation to the finished root-definition, which is the gap between the present and the future strategic goals. The meta-level activities should at the beginning include all the actors interests, as they are so few numerous of connecting factors can be taken into account, i.e. the blackbox is small. Even though there are quite a few activities this level should not take too long, so the purpose of the problematisation will not have surpassed. The activity root-definition (Johansson & Jerk, 2004) is added to ANT, to visualize the actual compromised problematisation to be solved, see figure 13.

The macro-level activities concern the standardization of values and how these are to be pursued in the current problematisation. The inscription activities are also included in the macro-level, as they concern the development of common routines and rules for the business, see figure 13. The final part of the macro-level contains the process of making a compromised action-plan for how the net is to evolve further. The black-box at the macro-level increases as the number of actors involved in the process increases, i.e. the number of factors possible to consider are decreasing.

The micro-level only contains two activities within the ANT, but is far from simple, as they concern the entire implementation and thus the business change process. As the ANT closes to an end the net is becoming a macro-net, with a standardized interface towards other nets. When the macro-net becomes stable it is declared the winner. This final activity is not included in the decision levels as ANT states this as the end of a process to reach a solution of a problematisation, i.e. the net is dissolved. To illustrate which activities within ANT that are connected to each domain respectively, are the activities both pattern and color coded, see the appended box at figure 13.

- Domain of Business vision and strategy
- Domain of Shared Principles
- Domain of Business process and development
- Domain of Decision process & makers
- Domain of Service-based environment



**Figure 13** The ANT visualization presented with the decision levels and domains of the new SOA model (drawn by the writers 2010)

## 5 Empirical result

The empirical material in this chapter is presented with the starting-point from the meta, macro and micro levels. The domains are included at the respective level, which was developed and presented in chapter 4, see figure 11. Each empirical part contains a general description of the different respondents' statements and thereafter the specific pictures from Trafikverket (TV).

### 5.1 Domain of Business vision and strategy

According to the respondents it is rarely expressed in the business idea that new services will be created, even if de facto services are created within the organization. At the top-management the knowledge regarding the service-concept is often limited, which includes how it can be controlled and developed from a high management perspective. Multiple respondents indicate a reason for this is that Service-Oriented Architecture (SOA) is a concept originating from IT and thus not mentioned in the business idea. In those cases where it is mentioned is when services are the foundation for the business. Swedish industries where services are mentioned in the business idea are for example banks and retail. The characteristic of these industries is that the time-to-market with the new services is vital, and one of the competitive advantages within the industry.

At the discussion of service-development with those who write the business idea, it is important to communicate with the right language. In connection to this the respondents mentioned that production-companies often are good at describing its processes and service-companies at describing its services. The respondents' conclusion stresses the importance to know how the organization works in order to get the message across. The interesting part of communicating with the top-management is that they have the official instruments, in the form of budget and organizational decisions, at their disposal.

As an example of the business idea with a service-approach service-packing is mentioned by the respondents. This type of services occurs in industries where the consumers and providers have a long-term working relationship. Further features for this industry are that similar preferences come from several consumers, these preferences are then packaged together. The competences with different co-workers give the input to these service-bundles, which in turn can create bundles both from a bottom-up and top-down perspective.

Multiple respondents describe organizations where the task to develop business ideas have been done during a long period. The respondents also state, when these organizations are acquired they do not have the capacity to change the business idea. There simply isn't the governance from top-management to do this. They continue the business as usual in the original down-pipe hierarchies instead. This implies, they don't perform the necessary changes in order to continue the development of services throughout the organization.

Trafikverket (the state agency for traffic) has the overall business idea:

*"We are social-society developers, who every day develop and maintain clever infrastructure. We are doing this in cooperation with other actors to facilitate life all over Sweden."* (Trafikverket, 2010<sup>2</sup>)

Described by the IT-strategist at TV, presently when the new state agency has been created more strategic services can be created, where information from both road and railway can be merged, and be used for optimizing the transports. The government's strategy for the TV's services has, until now, been that this information should be for free. The last couple of years the government has opened up the possibility for being able to charge for services by the consumers. To be able to begin with billing-services TV must create a billing-model, which is currently not in place.

In those strategies where service-development is included, this ambition can come to nothing as the pressure is too high at the IT-department to deliver within the existing projects. The delivery is to be ready and done within the project-plan, even if there are roles in the organization which can govern according to the agreed strategies. Further described by multiple respondents, this often leads to compromised solutions where the overall scope and service-implementation may draw the short straw. Other factors which affect how well the strategic service-development can be implemented, is the access for resources with the right competence. If there are only resources available with the wrong competence, the strategies can't be fulfilled within the set time-frame.

If the changes affect a complete industry, the changes according to the strategies will be taken in separate steps, states respondent O. The occurring changes are either slow or quick. The speed depends on the world-coverage, as well as respective organization's own strategic steps in order to keep up with the industry or lead it forward.

That the IT-strategy must originate from the business strategy is indicated by the respondents. This means the IT-development decisions must be done closer to the business than they are at the moment. Even if there is a central IT-development department the operations must decide for themselves over their IT-needs. The role of the central departments are thus to manage the IT-strategy, IT-architecture and integration issues. CIO or a similar role needs to be responsible for bringing the new IT-strategy forward, and coordinating it with the business strategy. The IT-department will be responsible for the strategic IT-orientation. In the new organization within TV this will be clearer, and the business will be the one's setting the requirements for the IT-organization.

*“The IT-strategy here is not more than 12 pages, or something like that, and I find that quite enough.”* is pointed out by respondent E.

The current IT-strategy at TV is based on existing systems and informational objects, and does not create demands on new information content. The role of the CIO is to create a more future oriented vision for the organization. In the vision new service-areas will be defined, based on the business strategy.

The strategy for TV's IT-competence states what the internal and external resources should be able to do. This includes how large the own personnel-mass will be, by defining key indicators and govern according to these. Several interviewees mean the external consultants' competence is not used in full, because they are not given information regarding the state agency's other development and plans, and thus can't contribute with the competence they have acquired at the organization. The strategic decision to produce a message-exchange system for communicating traffic-information was based on the increased number of actors who needed to obtain information. There were also internal operational problems at deployments, i.e. a need arose for standardizing the actual transfer. The decision to implement the system was an internal initiative. The orientation of the decision was founded on financial incentives, based on a life-cycle cost analysis. A decision later questioned as there were different ways to implement, and thus license, for the competing product instead of the chosen solution.

Most of the respondents within the state agency give the same vision concerning the internal discussion of how the future strategy for the message-exchange system is intended to be. One alternative is to let an external information-broker manage the information. Or, as suggested by respondent H, create a so called fire-hose, in which the information from the state agency freely flows to the subscribers. The advantage with an information-broker is that development of the information content can be done by the external broker. They can further develop information flows and services for and towards the market. The advantage for TV is that they are instead able to focus on the internal processes. The disadvantage is that they release the control over the information and its content. A fire-hose solution would create advantages of scale for the increased number of consumers, but the ownership and the market connection would still belong to TV.



A rich picture is given by the respondents, an introduction of a service-oriented approach means the organization which has supported a functional oriented approach must change into a service-oriented organization with clearly defined domains. It is the ownership and budget-responsibility which must be transferred and managed through their respective service-domains instead. If the ownership and budget-responsibility stay within respective function, can this cause sub optimization at the development of different services. According to the respondents this can be solved through an implementation of an integration center, with the responsibility for IT related integration strategies. At the receiving business operations a clearly defined ownership must be set to each service. This can be divided into a strategic responsibility and an operational ownership. As an example a consumer-order service can be mentioned, where the strategic responsibility is placed at the market department and the operational responsibility with the customer-service department. In practice, organizational changes will only be carried out within the IT-organization as it is there the SOA will arise and be implemented. One advantage the IT-organization can achieve is a clarity within the department regarding the own resources.

At the interview with the respondent within TV's market department it is described how the future service-development is intended to work. There will be a formal group, as opposed to before when it was an informal constellation. This group will include competences from both the technical and market side, together they will manage the future service-development. The responsibility for the service-portfolio is a new appointed role, which will be responsible for this formal group. The strategic responsibility to develop services lies within the community area. The traffic area will be in charge of the operative creation of services. The influence of the business- and IT-strategy is not meant to come directly from the market department. In today's TV owners are only appointed to the external services, the internal are only expected to function.

A coherent picture from TV's respondents regarding the appearance of a project organization is given. There is first and foremost a sponsor, who is responsible for the project initiatives and is usually a part of the steering committee for the projects. The sponsor has the authority to make decisions during the project cycle. Before the project starts a clear internal decision process is decided upon, which depends on the financial scope of the project. During the end of the project the implemented solution is handed over to the maintenance management, even if this transfer is not described officially in the project model. During a project TV has a close cooperation with pilot customers, as they in sufficiently large extent usually don't have access to physical test environments to test themselves.

The IT-organization within TV is described as a relatively self-governed organization, where the IT-department can make decisions regarding which IT-project to focus on. This is changing, though, and the business will in the future receive this authority. This is meant to be clearer in the new organization. A clear holistic view needs to be formulated in order to be able to manage the larger size of the new state agency. Within the traffic division the system managers and owners have the responsibility for 3<sup>rd</sup> line support, as well as further development of a system during the maintenance phase. The budget is posted per system, and is divided into an operative- and a maintenance-budget, where investments are included. Overall decisions regarding TV's operational and maintenance budgets are taken by the government.

The future organization, as described by TV's respondents, will include a central IT-function with the responsibility to manage integration, its technique and strategies. This will be a central function which the entire state agency will use, according to respondent A. The probability is, the centralization will affect which products that will be chosen for providing data. When new services are implemented cooperation with, for example standardization organizations and corresponding government agencies abroad can take place.

## 5.2 Domain of Shared Principles

When selling or developing services for consumers it is important the consumer and provider of the service speak the same language. This is emphasized in different perspectives by all of the

respondents. This applies both ways, the consumer needs to understand what will be delivered and the provider knows what was agreed upon to be sold. It is then easier to know where the liability limits are drawn between the two actors. Due to the abstract in a service-orientation, as it does not have a physical form and clear content as a commodity. But on the other hand have commodities its physical form, but is vaguer regarding the actual benefits. Or as respondent E, expresses it:

*“If you have a service-packaging and description the consumer understands, then he can relate to it. He knows what he orders. But if you have a service-packaging he does not fully understand, then he does not know if his problems will be solved or not.”*

The experience of the consulting interviewees are, when it comes to services have the companies recently awoken for it as a concept needed to be discussed. It is though mainly from the IT-departments they have awoken and started to discuss with the business operations. For a better success rate, the actors need to talk about the same things. Therefore, the services should be presented and documented at different levels, as well as for different target groups. The documentation for the different target groups is meant to promote communication between IT, integration consultants and the company’s business-operations. What is turning, within companies which respondent N have had contact with, is that they are beginning at a lower level to take an interest regarding services.

Discussions are not facilitated if the separate departments use different names for the same process. An example is if the bank, finance department and IT all speak about the same process, but have different titles for the information flow. The different actors thus need to come to a consensus of what the process includes. The activities must also have unique titles, in order to facilitate the cross-departmental communication. The title does not have to be the title of the actual process, but still needs to identify what process the service supports.

The IT-services should be modular and usable for describing what is supported for the business. Therefore the service must be broken-down at both the business and the IT side. This will give IT and the business a better ability to discuss them together, which is emphasized by the third set of interviewees. The service-repository is the system connecting the different parts in the organization with IT, i.e. it is the place where the services are connected. Based on this respondent L and M imply, it is not so important from where you begin to build services, it is though preferably based on the business processes or needs.

During discussions regarding communication of services with the business the understanding is needed that the actual service can’t be presented, the business is usually only interested in the actual functionality. It is then suitable to discuss information-objects instead of applications, and package this as a business service. Everything to create an interest with the business!

The experience of the respondents is, a lot of organizations are strained and don’t have the time to discuss service development in a good manner. They who have participated in modeling often see how the service-development affects the entire organization. A re-organization might be needed, and as described by respondent L; the development is often rejected as THEY are not ready for the change. This is why it is important to get key individuals who have knowledge, responsibility, as well as authority in the discussions.

When developing services it is good to jointly (business and IT) draw how the processes are to function. The overall impression by the respondents is, this picture will then form the base for IT to see where services are suitable to build. The business participants need to know what functions/issues other parts of the operations have. A milestone in this work is to draw the process at an overall level, including the concerned systems and a statement regarding what the services are meant to support. It is important to enter early in the discussions for increasing the understanding of why a certain project may need more resources. This may ensure a service can be developed instead of the specified and ordered integration in the project. To attain an understanding the benefit arises first in the next project when the service is reused, the actors need to discuss functions instead of technology. Preferably, this work can be headed by an architect, who has other perspectives regarding the governance of services.

A method mentioned by the second set of interviewees is OASIS (Jones, 2005), which supports the work how integrations are to be delivered to the consumers. The first step is to define the business' service-descriptions, where the service is broken down functionally for the operations. E.g. who needs the function/information and who uses them. This description must be prepared at a very high level for the organization's processes, and should not be more than five. These are then broken down to a reasonable level, which the actors can communicate from and thus are the descriptions useful.

The second set of respondents means an issue belonging to service development is for an organization to become flexible in its business, they also need to be able order well. It is though a big difference in the maturity and understanding for IT in organizations, and how they order IT in different projects. The consulting respondents use different project methods to increase the level of quality when ordering. Even if they order differently it is good if the orders are described in approximately the same way.

It is important to produce definitions and processes of what the service is meant to support. Respondent I pushes hard on the fact the definitions must be clear and distinct to facilitate the communication both within and outside the group. The processes need to be documented, and as the respondent points out they need to be done at different levels, i.e. the processes at a higher level and the technical at a more detailed level.

One part within this domain is to produce a strategy for which system will hold the master data and clarify the liability limits, i.e. support the coordination of IT. This information must be introduced and stored in a service-catalogue, which can be used by the consumer (both internal and external). This task though is too often not completed. The information regarding services is often retained within the integration center. A problem, if the service is not owned by the supported business process, the ownership will be connected to the IT-system management instead. Thus the service is not naturally marketed outside the IT-department. To remedy this it is appropriate to make the service and the type of information it manages searchable in the service-catalogue or -repository. A benefit with a strategy for the master data is to force the project and purchasers to extract the master data in a standardized way. What IT must produce is the requested services and expand them gradually. Services are more a mental attitude within the projects than a technical issue. Therefore, the documentation of the services must begin at once in order to start-up the service-catalogue. A suggestion is to begin to document the integrations as services, to provide the business the possibility to see them and therewith increase the interest for services.

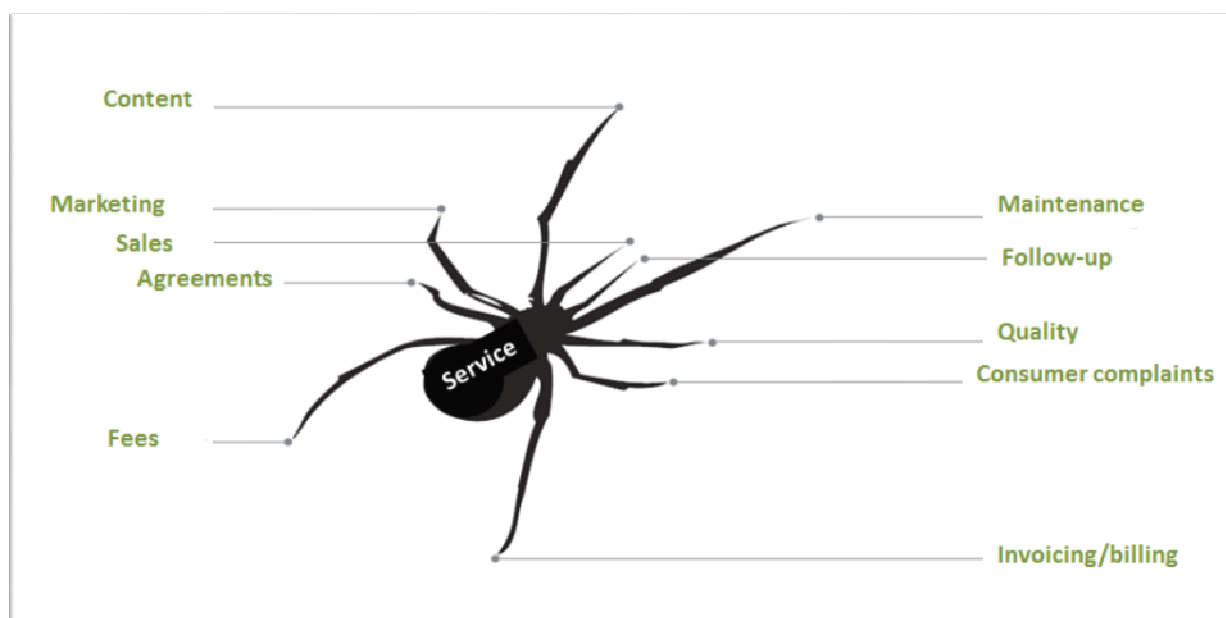
A problem emphasized by multiple respondents is, the services are rarely documented in a good manner. The organization can see the benefit, but other investments are prioritized (as it works anyhow). This is unfortunate, as it is harder to try to identify these flows in retrospect. The respondents indicate that many can produce the documentation, but fear it will not be updated and maintained, i.e. "wasted" money for the organization. Companies, which realize this is a long-term investment, still have a certain amount of resistance. Meaning the maintenance function needs to be ensured first. Therefore it must be communicated that this governance is not meant for the developer, but as a support for the business to achieve coherence and understanding for how the process connects to the service.

At the beginning of a service-development project it is important to gather the required competences, in order to see the whole picture and also decide to proceed with the task. In this group the business, finance as well as IT-department must participate. TV has two formations which concern service-development and its architecture. The first is an integration group, who is an actor for the internal architectural development and solution, as well as responsible for the governance of master data. This group has the responsibility to produce strategies for integration, architecture for the IT-systems and their integrations. They will thus be an important actor for the technical part of the task. The integration group has, apart from responsibility to test and validate the developed and proposed architecture, the responsibility to prepare and advocate technical platforms. The other formation is a user-association formed for the studied message-exchange system. The group intends to together with the consumers gather thoughts and ideas for development from a consumer perspective and need. The studied message-exchange system does

not have any direct users, as the system neither stores nor refine information. In the user-association discussions are held with the consumers regarding development, and consumer needs can be presented. The demands are though most often directed to the original source-data systems. This means the system manager for the message-exchange system acts as an interpreter or enterprise architecture between the stakeholders. The user-association is a good communication link for concepts and definitions to the consumers, as the meetings give a shared understanding for the common linguistic. It is then the system manager's responsibility to convey this concept base and other information to the source-data systems' management teams.

The former strategy for competence recruitment within the railroad part of TV was to use mainly consultants in development projects. The advantage for the organization was to minimize the risk for surplus of staff, and TV can bring in the expertise needed for the current project. The disadvantage is, with in this case 40 consultants per 60 employees, the consultants can unknowingly of each other develop redundant functions simultaneously. A lack pointed out was that the consultants are not allowed to participate at information meetings. This gives, they don't have the understanding or the knowledge of development projects within other areas.

TV has begun to discuss the service concept. In terms of organizational structure a service-portfolio responsible has been appointed at a central level. Discussions to reach a shared picture of what a service is has begun, which they internally refer to as the service-spider, see figure 14.



**Figure 14 The Service-spider (Tjänstespindeln) from Trafikverket (received from respondent G)**

The service-spider covers ten areas regarding services, which ranges from the purpose of the service to maintenance and billing:

- Content: what is the purpose of the service, what is included in the offer, who is the target group and when, where and how it will be delivered.
- Marketing: the services must be clearly described and communicated (both internally and externally), have an efficient market offer, i.e. the right offer for the right consumer. The service must contribute to maximized capacity.
- Sales: routines for the application, change and cancellation of all services, routines if the service has "sold-out", proactive relation to the consumer, and routines for follow-up and communication of orders.
- Agreements: clear conditions for service provider and/or separate contracts/conditions.

- Fees: all services priced and routines for update of fees.
- Maintenance: a common maintenance model for all services, and a service coordinator per service to watch the spider and suggest measures.
- Follow-up: support and routines for follow-up of each service and “spider leg”
- Quality: relevant and measurable quality levels to consumer, as well as target and measurements for internally increased efficiency.
- Consumer complaints: clear and communicated principles for consumer complaints and support and routines for handling complaints.
- Invoicing/billing: implemented and secured billing routines, routines for monthly follow-up, and discontinued self-billing from consumers.

### 5.3 Domain of Business development & process

A process is a continuous event phenomena, the concept is though often used as a metaphor for the liability limitations than an actual job done, states respondent O. How to act and perceive the surroundings, or what happens with the actors involved is thus not a process. The drawn process will never cover everything, external influences will always affect the process in a smaller or greater extent. A process exists on different levels, from a technical and detailed, to an overall business process.

The majority of respondents from both the first and second interview set have the impression the maturity towards integrations has evolved during the last couple of years, from having a spaghetti-architecture (point-to-point) to talk about services. From the point-to-point architecture the issue regarding integration connections which could be reused evolved, but still with a technical focus. What the respondents see as a challenge is to develop services instead of integrations, which are developed from the projects’ need. The target to implement services can exist on a strategic level, but is rare. Strategically, the infrastructure is more described as developing a flexible IT-environment in the organization, where services can be mentioned. The problem has been the service concept was driven from IT and is thus not a part of the top-management’s agenda. It is though not unusual with targets to become service-oriented in the IT-strategies. It has not yet reached all the way to the business what the benefits are with developing and working with services. The management is often only involved when purchasing a business system. The focus for the management is then usually to get a good user interface, and not to have a shared service-approach in the company. Respondent H, states regarding where to start a development process:

*“It is important for the information supplier to start from what they can, and build further from there. Than taking a too large scope and not cope with the task.”*

A business process needs to be developed with a top-down perspective, according to the respondents. This will yield the possibility to identify the business benefit with the process early. The result of identification of the benefit then needs to be funneled down into a number of requirements. These requirements will in turn set the demands on IT, e.g. which information will be affected in which systems. It is at this stage of the development and implementation of a process the analysis regarding services or straight integrations is required to be performed. The choice depends on if the business can see if the flow is similar within other business areas. It is necessary the process and service development receives a top-down perspective, as the only reason for having an IT-system is to support a business process, states respondent N. The probability the design needs not to be rebuilt and the hit-rate will increase, is if the business specifies how the processes are to function, rather than IT guessing how they will work. In the solution and the description of a service it is important not to include the organizational hierarchy. Because the hierarchy will change over time, while the service or function often has a longer life-span.

Services don't always evolve even if the management has the notion something needs to be done. This occurs, according to respondent M, when the implementation of services is a major issue for the organization or the industry. For the organization service development can mean they need to integrate with competing companies, i.e. package their product with others, or the production needs to be reorganized. Another reason why a top-management strategically don't choose services is that the concept is too abstract and thus difficult to overview what a service implementation means or affect.

The request for service development most often come from IT-departments. The general view with all of the respondents is: it is through the technical development the integration consultants come in contact with organizations. The interviewees also agreed upon they would rather come in contact with the business, in order to enter higher up in the hierarchy. One way further (up) in the organization is with the "Good Example". The example will show what benefits an implementation of a service can provide future projects. The development of services is often driven from IT, which is a problem since only they will know the service exists and can be reused. Though, it may be good for IT to structure the technology.

In order to succeed better to attract the business for the design of the solutions (which is described as a success factor), the benefit needs to be described and communicated. Another way to attract the business is to connect the ownership of the services, both on a higher and lower level. The ownership should be connected to the process owner in order to create business cases regarding services, implies the respondents. An arising problem is that the ownership is often connected at a too low level, i.e. the owner only sees the own system and don't have control or ownership of the process. This leads to a less degree of coordination, as everyone naturally hold its personal interests before the organization's interests. An issue which may have great consequences is managing the master data in a highly decentralized organization. Another common phenomenon at discussions regarding processes is that the business don't see the entire process, they only know their own contribution. E.g. they don't know what the receiving department use the information for. This can lead to the existence of several dead-end-flows, without being questioned. When a service is to be implemented, these are easily identified as both sender and recipient of the information need to participate in the design of the solution. Some service developments have evolved into large IT-projects and not reached the target, which means those organizations don't want to discuss services. To keep on track it is important to separate the ownership for services from the system, as services are meant to be more generic. If the ownership for the application is located locally and services centrally, the services will in turn become more flexible (reusable) and therewith receive a higher status.

The connection of the ownership to the right level plays an important role if a high degree of consultants are used. Since the consultants' only focus is to solve the current problem or ordered solution, which gives an unnecessary risk. Therefore is the governance of the consultants a big issue, as they only "perform according to agreement", according to respondent D. Since the consultants don't have the complete picture, the role of the purchaser needs to be clarified and the order process structured. I.e. the purchaser must be better to see the whole picture, is also implied by multiple respondents.

When services are developed the actors must not emanate them from the process, is emphasized by the second set of interviewees. The risk the service will be built in downpipes will otherwise increase. I.e. when a new process is to be implemented it is easy to build a new service as well, because they can't see the already implemented services will support the new process. It is thus important at the development of services the descriptions are held general, in order for all to be able to use them without losing the meaning of the service. This description and documentation therefore needs to be updated and maintained continuously, which can be done in a service-catalogue.

To succeed with a service and thus reach the planned investment-benefit the design must focus on giving the service a high quality and be user friendly. Concerning the quality expresses respondent I this clearly:

*“The owner of the information needs to convey what they can do and not what they want to do.”*

User friendliness is the other important aspect to achieve the benefit. If the service and information is not used then the benefit of it is not reached, as the information only has a value when the information is used or refined (Bradley, 2011).

A pitfall when developing services is that only IT cares, is the common understanding of the interviewees. This may occur if the descriptions and documentation is too technical. This requires in turn, the IT-competence needs to be high to achieve the understanding of what has been done. For the benefits with the services to be generated both IT and the business must speak the same language. The important issue is that IT understands the business language and what they are really requiring. Services must be documented in different ways, i.e. it must be a clear description in the service-catalogue which business or processes the service actually supports.

If the service will be sold to an internal or external consumer it needs to be packaged. Traditionally services have been developed through long collaborations, as respondent O expresses it:

*“If you during a long period of time work with several types of consumers and industries, then frequently combined and simultaneous wishes will often crystallize. That is what becomes service-packaging.”*

If the actors are competent within their area, they can always come up with services which can be developed within the industry. If the resources to perform the service-production exist, it is often already structured, in order to know who and how the resources can be exploited. When it comes to services, the providing organization is limited to its personnel's competence and if the resources are available at the moment. It is not possible to replace one competence with another at the sales of services, e.g. a java developer can't be replaced by a cobol developer.

A suggestion to develop services, from one of the respondents, is to introduce a fire-hose solution. A fire-hose can be divided into a commercial and a non-commercial part, where the first is a billing-service and the latter an open and free channel. In a fire-hose (or streaming) it is up to the consumer to build the technical environment for managing and refining the information. The respondent stresses, it is important at the specification of the service to consider that it can't be changed over time, which puts a high demand on the purchaser. It is therefore better to start at a smaller scale and with the information the provider knows has a high quality. However, it is perfectly acceptable to increase the amount of information fields over time.

Within TV discussions regarding letting an information-broker manage the information for the consumers have been held. As the number of consumers is expected to increase, the load on the existing organization will become high. An information-broker has also better possibilities to convey information to more actors. TV is currently only conveying information regularly to subscribed consumers (railroad companies) and for example students at a single request. An advantage when reaching additional actors is, they can use and refine the information or create applications which can be of use for more people. With the information-broker solution additional and interesting services can be built if the broker connects information from other areas. As an example a merger of the timetable from the railroad and the air flight timetable can be mentioned. If this is bought by a shipping agency, they themselves can create alternative routes for their goods in real time.

## 5.4 Domain of Decision process and makers

The governance of a new service needs to start at the top level, where this must be a part of the strategic plans, imply the respondents. Not only in the IT strategies, but also in the business strategies as this is not an IT-issue, but affects the governance of above all the development within the business operations.

The development of services will need to be marketed to the top-management, as the official governance instruments are controlled by them. Consistently for the interviewed consultants working with implementation of integrations and services, is that they wish to enter higher in the organizational hierarchy. This is due to the budget decisions are based on the strategies. Often the budget for the integration is given according to a specific solution within a project, which will solve the integration but services will not be developed. There are, according to the respondents, no longer any technical obstacles to develop services. The biggest obstacle why services are not built within an organization is that the development is driven out of the current projects.

If it is not possible to initially reach the top-management level it is the requirement petitioners, who are responsible to order development, the interesting party to get in contact with in order to govern towards a SOA. It is at the discussions and development important to find a counterpart, who has the possibility to allocate funding to the abstract in the service development. When communicating with management teams or the business, those who propagate services need to show how this investment will provide coming projects the possibility to recover faster or future implementations will be smoother. Therefore it is needed to use another language with the company management teams, which an engineer is not always good at due to their technical background, according to the respondents. It is though most often IT, which is the purchaser of services.

Organizationally it is good to have an integration board or center. In which the orders flow through, to make sure the purchased developments follow the right path. It is otherwise a risk the project's scope swells and becomes unmanageable, as two of the respondents present examples of. When services are developed, different roles need to participate and decide upon solutions. Examples of roles mentioned explicitly are business architect, enterprise architect and solution architects. The responsibility for the solution architects is to identify if the integrations are suitable as services, i.e. decide upon the probability if the service will be reused. The business architect needs to participate as they have the understanding for both sides, as it is at the design of the solution the actual governance towards services occurs. The stakeholders with project targets don't need to participate, the strategically focused roles should rather participate as the approach is to go towards services and working with long-term solutions. It is, according to the respondents, an enterprise architect who needs to keep this group and issues together. Other roles which may need to participate are the responsible for the systems the information is to be extracted from, as well as engineers who can contribute concerning the technical solution. The architects are those who identify the benefits with the services, and thus want to implement them. Most often they meet opposition as it is too expensive, unless there are several projects running at the moment needed to be managed at the same time.

Regarding governance it is mostly IT-governance that is spoken of, depending if the maturity of the organization is high enough for discussion at other levels, is the experience of respondent N. It is when there are large enough consequences for the organization that the discussions are picked-up at top-management levels (e.g. the steering board needs to defend results and consequences which could be remedied with IT/services).

The respondents explain services as created connections which can be reused. A problem regarding the governance of service-development is that the business operations often poke in a too low level. I.e. they control their need in detail instead of creating a better understanding for purchasing a function. The business is not supposed to know which system manages what or how it works. The detailed level is a remnant from before when the IT-maturity and its coordination



were low, and they needed to order each part separately. It is now a question regarding attitude and approach of what a business is responsible for and what they will purchase, i.e. they must only order function or service. The business could unconsciously control the choice of system before. This had a negative impact on the development of services, as two business operations could have seen it as two different needs. Thus were redundant functions bought or developed, because they did not have the view on the overall impact caused by the separate IT-choices.

*"IT is important to start somewhere, not try to implement all at once. The most important is to start."* emphasizes respondent N several times.

After a service has been decided for and above all after it has been implemented the services need to be marketed. The operations must know the service exists, as the benefit with the service to a great extent arises at the reuse of it.

Within TV decisions around a project and development are performed federally. This means the decisions regarding implementations go as high up in the organization until the management level has the authority to decide for that size of investment. The consequence may be that the decisions need to go as high up in the organizational hierarchy as general director level.

When it comes to projects, within TV, is a representative or sponsor from the operations. This sponsor has the authority to make decisions within the area and decide regarding development and prioritize within the funding. The sponsor has therefore a heavy role at the development of a project plan, idea formulation and the decision regarding implementation. The sponsor has for the most part its role within the business and has therewith both the authority and support the business will get what it needs.

TV has started a large assignment by structuring the governance regarding services. The spring 2010 was a new internal organization appointed for service-portfolio governance, which will be the decision-making body regarding which services to implement. In the current situation formal owners for the existing services are not appointed, but legally is the responsibility placed on the infrastructure manager. Control wise the IT-department have been able to decide which project will be developed. This is changing and the business will have this mandate in the future. This change will be clearer in the new organization. A clear overall perspective needs to be formulated to be able to manage the new size the state agency will gain. Within the traffic-information department the system managers and owners are responsible for 3<sup>rd</sup> line support and for the further development within the systems' management. The budget is set per system and is divided in an operational- and a maintenance budget, where the investments needed are included. Each system management and operations can make developments within the assigned budget as long as the set targets are achieved. The system owner has the power to distribute budget and resources to a certain activity or system. The respondents, who currently manage budget issues for maintenance and development, perceive this to be a good solution. Since they within their budget frames quite freely can transfer resources to activities of their choice.

The calculation of benefits or the return-on-investment (ROI) for services is not mature. According to the interviewees any good methods do not exist or as it is expressed there are no ROI's to recoup the investment for services. The performed calculations are often based on the process, i.e. the difference in having a manual or automated process, or what mismanagement may implicate for the business. The management can more easily see a financial benefit of being able to reuse previously developed parts in a new project, as the benefit will be visible at the reuse. The benefit calculations are managed at an overall level, i.e. not formalized but a specification of what needs to be done or function. It is as one of the respondents expresses it often a gamble that this is a good route. There are calculation models, but services are often not too expensive, the question is to achieve the right mindset and make sure to document the services.

The benefit calculation for projects within TV is always based on a socioeconomic profitability and thus not only an internal ROI. An example given regarding the prioritizing of development regarding the investment is meant to yield the maximum benefit per traveller. Or as respondent F explains his view regarding investment calculation:

*“... if I can reach more travellers per SEK it is more profitable for TV.”*

The investments are otherwise based on the benefit it provides for the railroad companies. To be able to make larger investments they can be financed jointly through a mutual business development. The next coming years the turnover is expected to increase. A large part of the new turnover will be charged through track-access-charges, which is a reversal. The service concept will change and become more distinct and defined. A better difference of what the consumer will have to pay extra for will be clarified also. What lacks is a support-system to manage the invoicing of both track-access-charges and future services. The railroad companies file themselves how much they have used the tracks, the internal focus is to manage this through support-systems. These systems will also provide a better follow-up for statistics, invoicing, sales and internal debiting, which is requested by the operations.

When developing new services consideration is taken to the existing inheritance, where TV reuse as much as possible. Abroad are there different divisions for traffic and infrastructure and thus different conditions for service development has been created. Respondent H means the inheritance can make the organization a bit narrow minded. Today, when the technology no longer is a bottleneck, fall it back to the people in the organizations to see the benefits with the project and thus willing to invest. This is a risk if someone influential in the organization states: this solution has been tested before. As it did not work then they discharge the solution, even though it might be possible today. Instead, a number of newly examined students can be placed in a room with the task to create innovative suggestions, which may give great profitability and benefit.

## **5.5 Domain of Service-based environment**

Several of the respondents indicate the internal consumer most often don't have the competence to order services. They are instead placing orders for a service piecemeal, i.e. via an application or a service-agreement. These orders are placed directly to respective process-owner, system-owner or operator. The demands put forward are very detailed and from a downpipe approach, i.e. the result of the order will only be operational for the own department. This entails, according to the respondents, the provider becomes too controlled in how the implementation is to be performed, i.e. existing and similar services are seldom used. The lead time the consumer formulates can also be an obstacle when creating general services, or increase the already existing ones. Further, the respondent means in the case when the consumer has access to the service-catalogue to order from, is the documentation often too technical for the business oriented consumer. A first step to increase the purchase competence with the consumer is mentioned direction to make functional-orders, which in a longer perspective will give a SOA.

The problem to create industry specific services is mentioned by multiple respondents. The difficulties lie in agreeing upon a standard on how the message will look like and be interpreted. This means, in some cases the industry don't progress in the creation of services. An example to solve these cases is the appointment of an external neutral part as chairman in a joint industry group. The neutral part added an academic industry-competence and created, with the help of students, services which were approved by all involved parties i.e. both consumers and system-providers.

During the interviews was the question “how the respondents viewed the future service development” asked. The mutual impression was, the belief the number of information services will increase markedly, with the orientation towards different types of consumer categories. An

example regarding consumer category mentioned is premium consumers. These consumers will receive a fast access to real-time data and have a high accessibility to these services. As they are charged for the services, they will be able to impose requirements on the provider and thus affecting the information content. Another consumer category is the free-riders, who don't pay for the service and thus will receive a later access for the data. This consumer category was defined by the respondents as undefined endpoints for the provider and will receive a lower accessibility for the services.

The respondents within TV have a clear view on how the current information-service consumers are defined, i.e. it is the railroad companies. An uncertainty about who the future consumers will be is present. Several of the TV respondents highlights, the number of requests for information have increased. TV is also more than happy the information is published, but currently have they not the resources, neither technically nor the staffing, to be able to do this. The descriptions on how the consumer will receive information, and can influence the service content implies there are multiple communication channels for this. The governance for further development of services takes place through a user-association, which is summoned by one of the consumers. The user-association meetings are held regularly, and the agenda includes the maintenance situation as well as new development needs. This enables a mutual agreement and understanding for development and consequences of changes for all service-users, which the TV respondents appreciate regarding the governance of the development. The information and description of TV's services are published publically via the service-description. Communication is also distributed to consumers at industry meetings and in the railroad Network Statement. The support channel for consumers is directed to the IT-function and not to the system-management anymore. This has decreased the amount of contact points for the system-manager. The railroad companies don't have a SLA written with TV, they work according to a de facto practice. According to the respondents TV is producing SLA documentation, which will include the elaborated de facto practices which already exist.

*“In the beginning were services the web services which were created by the IT-organization.”*

Respondent I states and continues with the view that services has evolved from being only a technical solution to include a business-orientation. Further change means, according to the respondent, the information content offered for the consumer has become more interesting.

*“There are no technical problems by producing services, what is lacking are visionaries to create new services!”*

Expresses respondent H and explains further, with the current technical development are there no technical problems what so ever. What are lacking are visionaries with business knowledge. The requested business knowledge must include the possibility to combine different businesses' information-objects into new services for the consumer. The respondent also mentions the ability to work agile and trying to make new simple services is important in the creation of services.

During the interview with respondent I, experiences with the work with services are described in the form of master data. The respondent's view is, when an organization does not have a clear and communicated ownership of master data will it create problems. These issues may consist of multiple replications of the information used in production, or changes will occur in the information objects in different places of the organization, i.e. a decentralized ownership. The respondent's solution is a central governance of master data and distribution for the local applications in need of it. Reasons mentioned for the problem is, the overall management has problems with changing the current decentralized ownership, and replace it with a central ownership.

Several respondents have experienced that development of new functions often happens in separate projects without an overall service approach. Different ways to govern this is expressed; (1) have an appointed role in the organization, e.g. an enterprise architect or a solutions architect with authority to govern the architecture of the projects, (2) create common goals for the service-

development with the consumer and thus increase the incentive for the single project or (3) create a service-catalogue where the business can indicate their information needs.

*“The basis was that we had to begin to standardize the communication externally”,*  
was unanimously expressed by the respondents at TV.

They continue to describe more incentives to develop the IT-architecture. Among others a complex test process is mentioned, as well as the expected increase in the number of consumers and end-users. The complexity of the test process meant, a change in a system created repercussions in another system. These dependencies gave rise to the complexity and the external consumers were affected at upgrades. Another incentive is described with a number of solutions to send real-time data, in the form of unique consumer-solutions. This was standardized in the new message-exchange system and the consumer received a common service format to use. TV's respondents describe this format was developed in consultation with the current consumers. The ancient hardware used has also increased the need for the development of a new message-exchange system. Internally within TV new functionality has been created to facilitate the addition of new consumers. This has meant the role as system-manager is more attractive and their work made easier, according to respondent F.

Several respondents within TV point out, the historical back-pack has given a great amount of resources have been plowed down in order to maintain and keep the existing services rolling. Therefore, new simple or more interconnecting informational services have not been able to be developed at the desired rate. The reason described is that a clarity from where the information originates is lacking, as well as who is the owner of it.

The implementation of the current message-exchange system was performed as a self-developed communication-component which provides a limited functionality. Limited in the sense it can only communicate one-way. Changes need to be done in multiple systems to be able to send information for a new consumer. The choice to self-develop is not described as obvious by the project sponsor or the project manager. It was only after a financial comparison between a standard product and self-development the latter turned out to be more cost-effective. A decision criticized by several respondents at TV, due to the decision basis. The project-time is described by the participants as relatively long, and the majority was spent on tests. Tests performed first internally within TV, and then carried out with the support of pilot-consumers. At the end of the project the maintenance-management participated, in order to assimilate the needed competence for the coming maintenance. As a clarification the quote from respondent H can be presented, regarding how the market perceives the switch to a new message-exchange system:

*“The state agency holds many assets in the form of above all information [...] and they want a good way to convey this in.”*

*”IT is not good that IT manages the service development, as it only gives advantages for IT and no one else.”*

The quote is expressed by respondent A, who further explains the demands to provide services are often low from the consumer. IT is usually the single broker who takes the initiative and develops according to a SOA. According to several respondents single projects can have the knowledge about an already developed service, and therefore use it. In so doing, the delivery of the requested business logic will be satisfied, and this creates “the Good Example” for what service development can be used for. Further the respondents imply the consumers experience an increased benefit. By pointing out this obvious benefit from more and more projects an interest with the consumer to order services is created, and thus the demands for development of services are increased.

The service-catalogue is the communication-channel to the consumer and therefore must be done in a stringent, agreed and understandable language. One of the respondents describes thoroughly how the process to agree upon the linguistics takes place. The respondent also emphasizes, the employees with operational knowledge must participate when the service-catalogue is created. If a service-catalogue is not created the knowledge regarding the existing services will be hidden within the IT-organization. This makes the services only visible internally within the organization. Several of the respondents mean the knowledge of the existing services only exist

with single individuals, and the documentation of the services gives the broker a total internal knowledge of its existing services. In relation to the development projects the work to create service-catalogues often begins late, or not at all. The answer to why this occurs is not a lack of software for this purpose, but due to the broker's priorities. Priorities made on the brokers view of priorities, its contents and what these resources otherwise can perform. Regarding the question of who will own the service-catalogues it is reported the ownership can exist with the business or the IT-organization. Depending on what is best for the single organization.

During discussions regarding the ownership of services the problematisation emerge that the ownership of a service is connected at a too low level within the organization. In the ultimate broker organization the service will exist within its domain (part of the business) and be owned by the business responsible for the particular domain. An example given is the function goods-receipt the services supporting the process must also be connected to the management of the process. This approach gives rise to a completely new organization where roles and ownership is transformed in full. The pragmatic solution to ownership and where it is placed in the organization, means the respondent, is the presence of a solution architect which is responsible for the service implementation and its maintenance.

The respondents from TV state, the initiative to implement an external communication-channel of service-information came internally from the state agency. Organizationally is the operations managed through orders from a department within TV and is agreed upon through internal SLA's. The operational follow-up is performed with regular intervals, where also priorities, bug fixes and upgrades are performed. The servicedesk and its current process manage the entire incident management, which is a relatively new way for TV to work. The responsible for the system management at TV describes, the development and maintenance is affected on behalf of the department with the ownership, and is performed by the operational development department. Consumer requests and bug fixes are described as having the highest priority. Further it is mentioned, the resource governance depends on available competences, and the internal resources are also directed towards the internally developed systems. The transfer of competence between the internal and external resources is too scanty and brings that the same service might be developed at numerous places within TV.

Multiple respondents mention, within TV internal services are discussed in order to give different projects the possibility to test news. A concrete example mentioned is to implement standardized software for messaging and thus provide the possibility to manage incoming messages. These discussions have taken place at an operational level, but have not yet resulted in a decision at the strategic level. Therefore, one respondent has created its own test-implementations in a project with the knowledge originating from external resources. To use external resources for this creates problems at an implementation, both regarding licenses and from a competence perspective.

To go forward with the development of services it is stated that TV has discussed to let an information-broker have access to the information. The information-broker in turn is allowed to market and sell the traffic-information to new potential consumers. The respondents at the operational level mean this would create a possibility to work with the internal systems and increase their informational quality. One respondent outside TV suggest they could create a fire-hose solution with information for the consumers. This suggestion means, TV would still control the information and marketing, but on the other hand would be able to offer it to numerous consumers.

# 6 Discussion

This chapter begins with an analysis of the theory and empirical data. The starting-point is the three different decision levels meta, macro and micro, which are presented from a net's development to stabilization according to the summarized actor-network theory (ANT) in chapter 4. The three decision-levels are connected to the five domains and thus keep this study's view on service-oriented architecture (SOA). In support of the implementation the SACIS-model (Johansson & Jerk, 2004) will be used and combined into a visual picture for how an emergence of a SOA will appear.

## 6.1 Analysis of Meta

### 6.1.1 Domain of Business vision and strategy

With the support of ANT is the meta-level described as the activities problematisation, identification of actants, creation of alliances or conviction and is summed up in a root definition, see figure 15. The problematisation is created from the business idea, strategies and the gap arising between these and the organization's current status. From a communicational perspective the action-plan continuation is the strategies which are to be communicated.

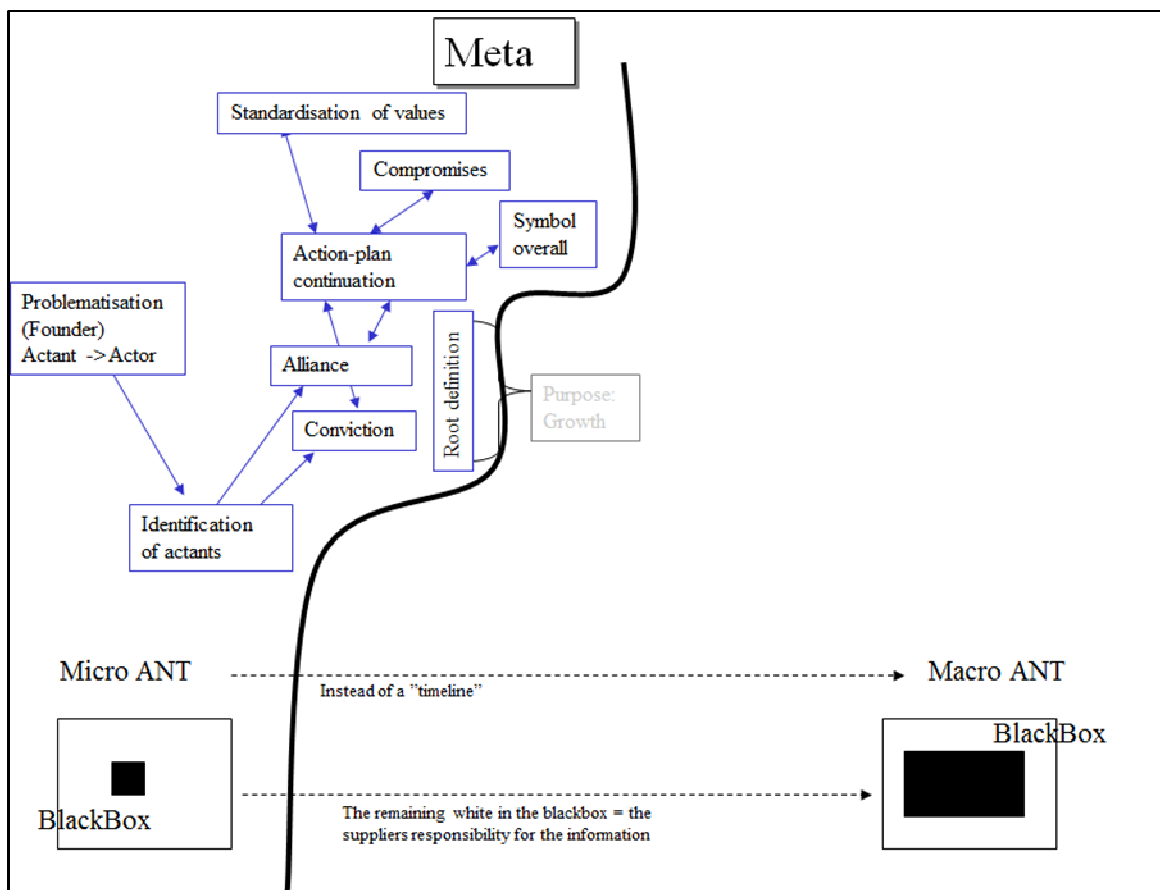


Figure 15 ANT from a meta perspective (drawn by the writers, 2011)

### Problematisation

The problematisation is the first step when building an ANT net where the founder will create a basis for what the idea means, and who need to participate (Czarniawska & Hernes, 2005). The

insight, idea or problematisation the organization will create services, will be created by a few individuals. ANT describes this as working with a small blackbox, i.e. many different perspectives of the problematisation are possible to consider (Latour, 1998). The low number of participating individuals during the problematisation admits that more issues can be highlighted than the ones finally being communicated, see figure 15. The problem with the low number of participants is that the dynamic of the discussions is decreased. The discussions are held at an overall level, and will in the end give different answers on why the net should be created and in this case why the organization will implement services. The benefit map (Lundberg, 2009) can be used as a tool and give descriptions such as increased flexibility or a need to faster meet the market's demand (Marks & Bell, 2006; Bieberstein et al., 2006). The flexibility or the speed to the market can be seen as benefit sources, and which areas within the organization that can create this based on those benefit sources.

The first overall document which gives an entrance to the problematisation is the business idea (David, 1989). The business idea or the overview of the context the organization exists in, is for example a desired consumer segment, technology and providers (David, 1989). The business idea must be unique and give an overall understanding for its purpose and context. The business idea is affected by changes in the organization's context, e.g. a merger between two or more organizations. In the business idea the new context will be described based on the new consumers and providers they are appealing to. Empirically the new business idea and governance appears to be problematic, as it is easier to follow old footsteps for the governance management. On the overall level in which the business idea exists, there are very few companies that mention services. If services are mentioned in the business idea it is in very specific service-companies, and is also more in frequent for new and smaller companies. The study is therefore indicating, the creation of a service-platform is rarely based on the business idea. The business idea will affect the attitude towards services as a concept and the possibility to implement them, this also depends on the type of organizational structure.

To break down and go forward with the problematisation the strategies need to be created based on the business idea. The strategies demonstrate how the organization will make the stakeholders content with the help of the existing resources and competences (Johnson et al., 2009). Another purpose with the strategies is to create an action-plan continuation and use this as a communication tool (Latour, 1998). When IT is seen as a support-unit within an organization it implies that there is harmony between them and that the balance will be maintained (Henderson & Venkatraman, 1993). When the business idea is created and decided upon, the individuals with the competence regarding services must participate (Marks & Bell, 2006). The study shows, there are often different competences missing in order to create service-strategies, indicating the actors with the right knowledge are not participating. Furthermore, this study's material imply that control and good quality of the services are created when the IT-strategy originates from the current available information and then gradually expand with further contents. In order to increase the internal communication regarding the services in both the business and IT-strategy the management gives a clear signal which direction the business has chosen. A communication which continually needs to be simple and clear in its message, so all stakeholders can take it to heart.

The communication of the strategies will, apart from being simple and clear, give guidelines regarding which goals the new investment are meant to achieve (Ward & Daniel, 2006). Based on the strategies the business benefit can be made clearer and be prioritized in a benefit-matrix (Lundberg, 2009). This visualizes if there are meant to be direct or indirect benefits with the investment and if a qualitative or financial benefit is expected. The study has shown, when the benefit with the service is not governed by top-management that is needed to be created through conviction with "good examples" of the business benefit. The good example can be shown from a lower level in the organization to market what services can do through already existing and available services.

Changes to essential rules within the industry affecting the different strategies, for example the possibilities to charge for services, these new prerequisites will give rise to new strategies. The basic parts needed to manage the change must be analyzed and then implemented. An example is the possibility for TV to charge for their services, thus the billing process and system must be upgraded. At a change such as mergers of different organizations the increased information content must be clear in the strategies. The content needs to include an identified and long-term benefit with the services, in order to increase the competitiveness for the organization. This implies, the strategies can't only be revised according to the calendar, but continuously need to be updated during the year.

The empirical data indicates, if the use of consultants within IT-organizations is high, it means the competence and knowledge will not be available internally for development and maintenance. A strategic direction for coping with this issue is to define guidelines and key figures for what the internal and external competence will perform, and how the allocation between them will look like. When the consultants have assignments within the organization, it is important to give them the possibility to participate at internal forums, and thus be able to share their knowledge with the internal employees. To use external consultants' specialties and transfer it to the internal employees is to use the cooperation with consultants and internal consultants well.

### *Identification of actants*

The founder of the net identifies the first actants which are needed to support the development of services, from both the business and IT-department (Latour, 1998). The actants add the business competence which combined creates a comprehensive view on how the organization's service-development is to be governed, see figure 15. Other actants can be external stakeholders which have the same problem. As a part of identification of actants the founder of the net will appoint owners for the services. An ownership, indicated by the study, needs to be at a central level to promote the development of non-redundant services. If the ownership is appointed at a lower level the consequence can be creations of redundant services, though with well suited services for the ordering department. To be able to understand the business plans the CIO of the organization needs to be a member of the organization's top-management, to retrieve knowledge and information for distribution to his/her own organization (Hoffman, 1988). What the CIO can redistribute is information regarding trends the organization will adapt to and the consequences for the IT-costs of investment decisions (Ward & Peppard, 2002). The study shows, within the business there must be process-owners, both for the internal and external services. If this is missing a formal knowledge transfer will not take place and the maintenance will not be visible within the organization at a merger. To create different perspectives to the process-ownership it can be appointed at different levels, as an example is a strategic and an operational-process ownership mentioned.

### *Alliances and conviction*

To fulfill the purpose to create a larger net has the founder two ways to do this according to ANT (Latour, 1998). One is through alliances and the other is through conviction of other actants (see figure 15), which the founder perceives having the right attitude. To be able to create alliances with other nets, the existing net must be attractive enough and have the knowledge of which net has interesting assets. The alliance must, from both the nets' perspective be attractive enough in order to be created. An example of alliances with other nets could be an alliance with industry specific organizations, or agreements with other supplying or consumer organizations. To convince single actants gives a larger freedom of choice for the founder, as this individual can choose who is to be convinced and thus make the net grow. To convince single actants makes the contribution to the net easier to find, but can be more time-consuming as it gives fewer single contributions to the net.

Mergers of organizations will form new nets and change the old interfaces, as well as their mutual relations (Latour, 1998). A risk which has been brought forward at the interviews is that the individuals are often referring themselves to their old net, e.g. keep the old title. The advantages of scale which is supposed to be one of the effects at a merger will then not be



achieved. The advantages of increased competence will not be used, and the leading position that can be created within the area will be taken by other actors. The study gives, the central formations formed at a merger, both for the business and IT, will receive an increased importance and power as the number of services and thus the information flow increases. In this context it is mentioned that even the increased service functionality will create a larger effect on central groups.

To introduce services for an entire industry make agreements of different kinds necessary, e.g. the interfaces and roles need to be decided (Marks & Bell, 2006). From empirical statements benefits can be yielded if you bring in an independent actor who governs this task together with all the stakeholders. What the independent actor adds in this case is a pragmatic progressing procedure/leadership. From an ANT perspective is the problematisation done, but the spokesperson who will bring the net forward can't be chosen from the own net. The solution is a spokesperson, who don't have any personal interests in the net, and thus can achieve the action-plans needed to bring the problematisation towards a stabilization (Czarniawska & Hernes, 2005). If the organization finds itself in a stable industry with competent staff the business idea can express concepts as service-packaging. This means, the current operations can create the services themselves, and test these with the existing and known actors. Interplay between management and operational staff will be generated through good communication and trust (Hoffman, 1988). The service-responsible role means to be able to operationally overview consequences. The role is also a spokesperson presenting the changes needed in the business, in order for the benefit of the investment to rise.

### *Interface towards macro/result from meta*

In order for the macro-level within the organization to be able to create a growing net, business- and IT-strategies need to be stipulated and thus create the frames for how the design is to be formed. A growing net can be created through alliances with other nets, or to grow through conviction of other actants (Latour, 1998). In the process of creating a root-definition, which means all stakeholders present their view on the mutual problem, has been stipulated with the meta-level strategies (Checkland, 1999). From these strategies activities will be created which will govern the organization from the current situation to the determined visions. This part the macro-level will use in order to create the design for decisions, see figure 15. Further result from the meta-level is the description of which competences are included, and how the ownership within the net's organization will be formed.

## **6.2 Analysis of Macro**

Within the macro-level the shared framework for the organizational agreements is described. The framework refers to how an organization will act regarding mutual decisions and its content, in order for the performed investments to lead towards the achievement of the business vision.

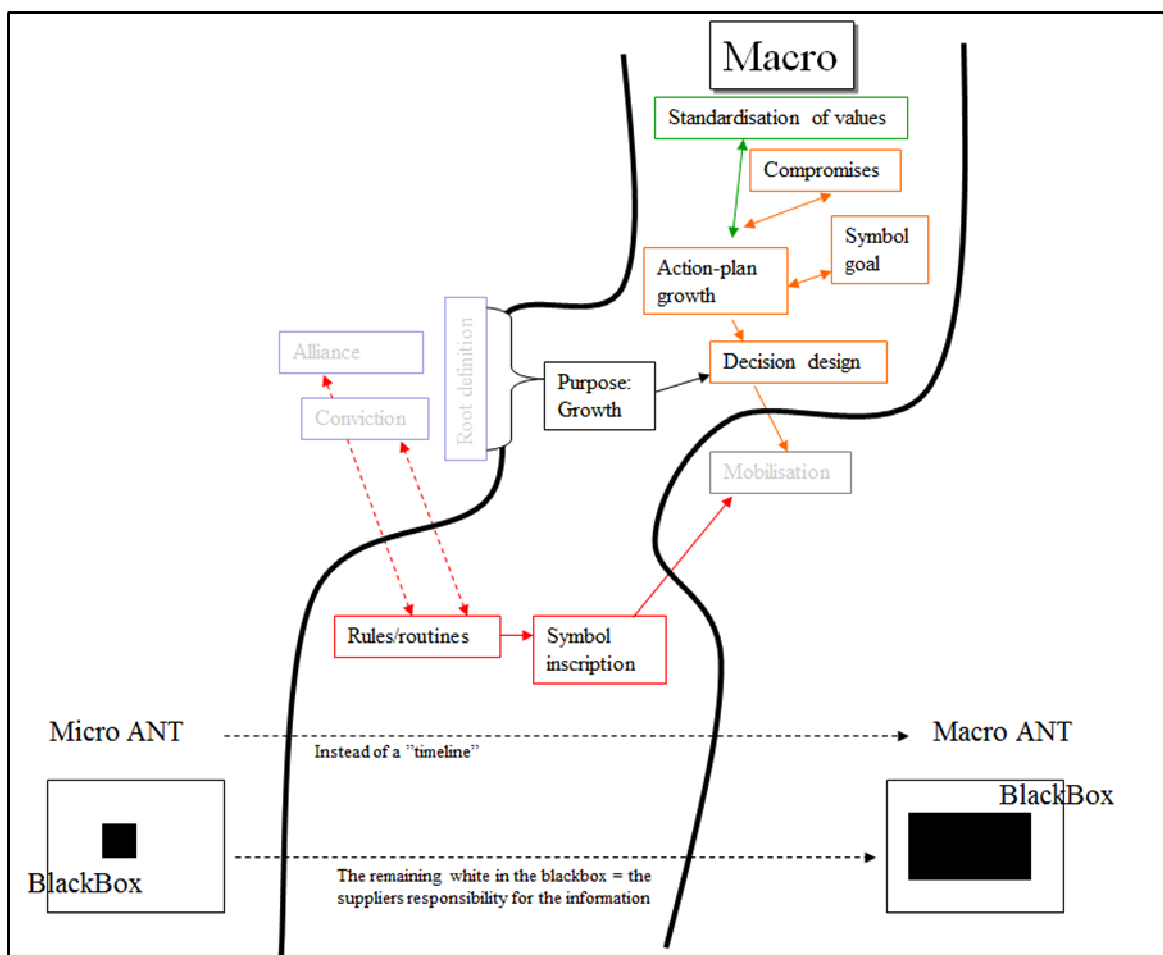


Figure 16 ANT from a macro perspective (drawn by the writers 2011)

### 6.2.1 Domain of Shared Principles

The domain of shared principles includes the common framework for shared values and constraints which are gathered in common policies and documentations. These shared principles can in comparison with ANT (Latour, 1998) be summarized in the activity standardization of values. This will then form the basis for the coming action-plan for mobilization, see figure 16.

#### *Standardization of values*

The interviews have given that one of the factors to succeed with an organization's common service-development is the communication and thus the linguistics needs to be trimmed. It is important the message and linguistics are adjusted depending on the target group. This gives that technical language is not suitable in discussions and sales of services at top-management. The language also needs to be adjusted to this target group, from the notion that the discussions focuses on strategic issues and are more abstract than detailed questions.

The mutually stipulated documents must cover the entire SOA-lifecycle (Marks & Bell, 2006). The SOA descriptions need to include goals, as well as what it supports both internally and externally. The documentation needs to be agreed upon, in order to make it a natural part of the SOA discussions and thus equated with policies. To be able to agree upon the mutual policies and language the affected parties need to assemble. The policies forming the foundation of how a SOA will be governed, can be divided into six parts (Marks & Bell, 2006). These types can then be divided depending on the organizational level, where the business and IT will receive more

agreed interfaces with each other. These policies need to be general, as not to risk different maintenance models for different services. A critique towards the description of these six types is that even though they are directed towards both the business and IT, they are more focused on making the technology function. To be adjusted into an instrument and a basis for discussions the following issues must be answered within each policy, from both the business process and IT perspective:

- Ownership followed by description of responsibility and its liability limitations between the actors.
- Each policy state that they are to progress in consultation so the technical or business issues don't take the upper hand and thus outweigh the other part.

TV has started the task of describing the frames for services by forming the service-spider, as a shared communication tool (see figure 14). The service-spider has compared to the OASIS (MacKenzie et al., 2006) and the nine criteria stipulated by Marks and Bell (2006) a good mixture of factors in order to describe their SOA. The spider visualizes TV's interpretation for how a SOA is to be perceived within the organization, which includes the stipulation of what a service needs to contain. The spider is a simple symbol of communication which is needed when communicating to a great number of actors (Latour, 1998), as it is understandable both from a business and a technical view. Each leg, or service-area, contains requirements needed to be fulfilled for the shared governance routines and processes to function in balance, as well as how to communicate, offer and market the services. The separation into the two service areas consumer complaints and invoicing/billing, might for another organization be unnecessary. The former can be included in the quality service-area and the latter can be a part of the marketing service-area. Based on the first set of interviews it can be interpreted that the spider has taken organizational boundaries into consideration, as the consumer complaint process is managed by another department than the service-owner belongs to. The invoicing/billing area is at the moment a great issue, as TV currently don't have a billing-system. This is for an organization usually already a stable process (or macro net according to ANT, an example of a problematisation that has become an actant again (Latour, 1998)).

An important part emphasized by the respondents is the de-prioritization of the service-documentation, which the management needs to include as a risk when prioritizing. If the ownership is not connected to the process-owner but to the IT-management, the importance of the documentation will increase. To remedy the lack of ownership within the business is to make the service searchable, in a so called service-catalogue. Here the service is described at different detail levels, i.e. how it is built technically and what it supports at the corresponding business level.

The study indicates, organizations are beginning to recognize the concept services needs to be discussed, both as a business opportunity and as a tool to streamline within the organization. This development of services has to be done in a dynamic formation, where Peppard (2007) present six competencies or translated roles in the development-cycle. The different roles are divided into two groups where three of the competences are needed in the phases of business-oriented development and the corresponding roles for the IT-department. Decisions and progress within each part needs to be checked during the process as not to risk parallel nets competing for the same goal. The advantage of the model is that it clearly shows a need for balance between the knowledge of the business and IT with mutual grounds. The communication between the actors at the different phases is facilitated if shared linguistics is produced for the levels the phases represent.

The shared language and documentation means the business can communicate easier across the borders, and the knowledge of where the liability limitations are drawn. This is important in order to make services and its architecture function well in the long run, which implies the businesses need to have the competence to purchase better. One respondent mentions, within the consultant-company they use a method for structuring the orders. Even if the maturity differs how the orders are placed, are they at least structured in a uniform way. This yields that the more experienced actors can notice easier where the gaps in competence exist. If the business needs an increased knowledge IT can support where to use services in order to facilitate a process-development. This

method also supports the identification of where the competence needs to be increased at the communication between IT and the business. The structuring of the choice of words and documentation of previous services can thus support in finding shared frameworks. It is according to respondent L and M not so important where to start this task, the most important is to begin.

The above mentioned reference frames need to be described at different levels. In order for the documentation to be more useful it is necessary to use the same titles for the same functions across the organization, says respondent I. It is important at discussions regarding a process, (e.g. a supplier invoice process) that each part of the process is presented in general terms so each actor in the discussions will know what is decided regarding the development of a solution. The documentation must not be too general. Each part of the service needs to have a unique and clear title. An important part of the service-development is to decide upon and document where master-data will be managed, one respondent means, it needs to already have been done in the strategy process.

The documentation of services is important. The respondents mean it is rarely completed. The governance of resources and projects need to see this as a long-term investment to facilitate the communication between the business interfaces. Since the documentation is not meant for the developer but as a support for the business to see coherence and receive an understanding for how the processes are connected. Even if the management sees the benefit with the documentation, it is still too often de-prioritized before new single project-goals. This can be a problem as it is harder to document the flows in advance.

An issue existing at service-development is to make sure the agreed and shared framework is conformed to (Marks & Bell, 2006). At the use of a high proportion of consultants, as in the TV case, it is the purchaser's responsibility to make sure the development is done within the frames. Within TV it is the manager of the service-portfolio's role to make sure the orders and ideas are coherent to proceed towards a long-term SOA. The manager of the service-portfolio is also a good role to be able to create new and composite services, as the role's responsibility is to overview the entirety for the organization. The role facilitates the business to develop services themselves, but where the central function overview the entirety, so as not to risk redundant service-development.

## **6.2.2 Domain of Business process & development**

Within ANT the activities are separated into two parts; translation and inscription (Latour, 1998). In this study the business processes and development are interpreted as inscription, see figure 16. The inscription incorporates two activities: rules/routines and symbol inscription. The first activity is meant to create a predictable base for the actors' behavior and the latter is the actual communication material (or symbol) for the rules and routines.

### *Rules/routines*

Rules and routines are described within ANT (Latour, 1998) and are in this study interpreted to concern the inscription within the business. The rules and routines are governing which development is needed in order to implement the joint development. Decisions regarding rules and routines need in turn to be presented for other actors in a simple symbol, which clearly represent the goal with the change (see figure 16). These rules and routines are also meant to create a behavior pattern for respective actor and net, to make the performed actions more predictable (Svårdström et al., 2006).

A process is, as one respondent clearly describes it, a continually occurring phenomenon, but is much too often used as a metaphor for the liability limitations than an actually performed work. Within service-development and performance it is not always clear where the delimitations are for a single process, compared to a production industry. For a SOA to be useful the business processes need to be the foundation and have an appointed owner (Sörqvist, 2004). The process must answer what, how and why it will be performed. The description needs to be done at the existing levels from an overall business process to a detailed and technical level. The process is

not to be mixed up with the boundaries within the organization. The boundaries are meant to clarify the liability limits between the actors and nets, as well as being clear for the stakeholders to follow them (Svårdström et al., 2006).

The service-development is often initiated from IT, according to the third set of respondents, though the business needs to participate (Bradley, 2011) to assimilate the understanding of the possibilities opening up for their consumers. One respondent means, everything a business performs and develops must originate from a business idea that someone is prepared to pay for. If only IT develops and uses services, large parts of the benefits can be missed. If the services are not matched with how the business processes function the possibility for reuse decreases. One way of making the business participate is to connect the ownership of the service and its function to the owner of the business process it supports. In order to obtain an overall view of both the IT and business needs, the ownership needs to, apart from taking a comprehensive grip, be described clearly reflecting both the responsibility and the authority. When owners are appointed to services it is important not to connect the ownership to an organizational department, or at a too low level, according to respondent L and M. It must not be connected to an organizational department as that will surely not exist for as long as the service does. Another reason is the risk of a service-development in down-pipes, which in turn gives an ad hoc and redundant development. A risk when tying the service to an existing organizational department is that the service disappears or the governance of it will be discontinued when a re-organization takes place. Connecting the ownership of the service at a too low level or to the IT-system's management might the business possibilities with the development of services not be identified. This is due to the fact, the lower level or IT don't have the dynamic competence needed for the entire organization to be favored (Lanzara & Patriotta, 2007). The interpretation is, the service' ownership needs to be connected as early as the design phase of the solution. The connection is important if to become a natural part of the development and thus facilitate the implementation. Another aspect is that the owner, who preferably is the process-owner, can participate and influence how the design can support the business in the long run according to the strategic plans.

The interpretation is, the ownership can solve the problem if the service approach don't obtain the weight it needs. The connections to the different levels will thus be check-points, precisely as in an organizational hierarchy. The service will have a centrally located ownership, as it spans over several areas. A specific system can have a more local ownership if the system supports a certain process. The system can, though outside the interface affect and be affected by the other nets within the organization. BDN clarifies this by emphasizing the need of ownership for each activity and process, the resources and authority will follow in order to carry out the changes (Ward & Daniel, 2006).

The interviews imply an increasing maturity towards integrations and its architecture, mainly at the IT-side though by removing current point-to-point architecture. The current challenge is to move towards SOA and not only integrations. The approach towards services has not yet reached all the way, the respondents indicate that top-management only participate in larger purchases such as entire business systems. One reason for this could be that the published literature regarding SOA is produced by engineers or for engineers. If the language and the focus are too technical the businesses have problems to interpret how the services will benefit the business processes (Erl, 2009). Thus it is hard to achieve a joint venture between IT and the business. Kettinger (1997) indicates, this structure can preferably be coordinated with the support of the analytical ability IT-personnel possess. One way of making the business interested in SOA is to exploit and govern the incitements (Lanzara & Patriotta, 2007). Or as was brought forward in the interviews, begin with the IT and then market the benefit through successful implementations and work the way up in the organization from there.

The development of services spanning over a complete business have to be represented by multiple competences. The competences need to be from both IT and the business, within the coordinator of the different actors' interests can be (Bradley, 2011). Even if the development-group have the dynamics and the organization the insight regarding the services benefits, it could be a too big change for the organization or the industry and thus still not be created. This third degree of change (Sörqvist, 2004) could mean the organization needs to cooperate with providers or consumers in a closer manner, or form alliances with competitors. An alternative route is to

break the need for change into smaller pieces, the organization could then manage the acceptance for change easier. When it comes to development of a SOA the internal infrastructure for information and its systems need to be titled and developed towards services. This provides the organization the possibility to get used to the SOA before allying with other organizations. Or alternatively convince the other actors regarding its supremacy, e.g. through acquisition or a joint venture with competitor or supplier.

Before the development is carried out the organization needs to be clear on what degree of change the design is expected to give (Kettinger, 1997). What the organization needs to consider is to keep the degree of change as low as possible and instead try to have more and smaller improvements (Sörqvist, 2004). The respondents also confirm, it is better to make several projects instead of one large, which is supposed to solve everything. The organization must start with smaller situations and build from there. One approach for service-development is to start from the current situation and the problematisation, i.e. don't change the existing architecture and let the SOA grow gradually. Incremental and iterative changes give fewer interruptions in the operations, as it is easier to absorb smaller improvements (Henderson et al., 1990). From an ANT (Latour, 1998) perspective this means, it is easier with iterative changes with the adjacent areas or nets. Over time it will become a larger macro-net, as the actors through compromises creates an alliance or convinces others that a mutual mobilization is the best way to grow.

The development of services needs to originate from an overall level. The respondents who mention the OASIS method (Jones, 2005), mean that not more than five overall processes in an organization ought to exist, they are otherwise described at a too low level. To begin from a high level and then break each process down into smaller parts can provide the management the possibility of identifying the benefits at an early stage. These benefits are then broken down into demands, which in turn set the requirements for the technology. This indicates the importance for top-management to participate in the decision making if the organization is to implement a SOA, as it is already at this early stage the decision to implement a SOA or direct integrations is taken. Another reason why the business needs to draw how the process functions is that IT can't guess. In turn the hit-rate regarding the IT-systems and the IT-service increases, according to respondent N. Since the only reason why an IT-system exists in an organization is to support a business process. Therefore the ordering process needs to be transferred from IT to the business, since the businesses needs and development possibilities should direct which services are developed. The conclusion is the business must understand that services in a SOA are not only technology. They are actual functions improving the operations, which can be sold externally. ANT (Latour, 1998) gives that the frames for the development process or the rules/routines produced, are produced parallel with the action-plan for the mutual design to solve the problematisation (see figure 16).

The organizations, which develop services for sales, need to be aware that one competence can't be replaced by another, or an agreed run-time can't be replaced by another time of the day. One organization is thereby limited in its actions based on the individually available competences and resources, according to respondent O.

During the study two concrete examples emerged regarding how an information flow based on services can be designed; the first is to introduce a fire-hose (or streaming) solution, and the other is to use an information-broker. When publishing information, IT and the business must cooperate since the business needs to decide which information to begin with. Suitably is the information with the highest quality chosen, so IT can obtain control over the architecture in the information flow at an early stage. This approach is also recommended by Sörqvist (2004) where he indicates that you need to break the larger changes needed into smaller pieces and thus perform several sequential and incremental changes over a longer period. The respondents also mutually point out that an organization must not grasp the entire problematisation at once, but begin with what you can at a smaller scale. The risk is otherwise as indicated in the interviews, the organization is stuck in a project with a too extensive scope and therefore receives/have service-development gotten a negative stamp.

The other concrete suggestion for a business to move towards services is to partner with an information-broker. Within TV this suggestion has been brought up as the number of consumers is expected to increase. Then this broker can support the work to intermediate the information for

more than the current consumers. An advantage is, the information-broker has the knowledge regarding management and distribution of large information quantities, and can in turn refine the information with other sources, e.g. merge TV's and Luftfartsverket's traffic information to be able to optimize transport routes in both time and distance. The conclusion to the discussions held by the writers is, this information-broker don't have to be an external actor. This will give the organization the advantage of keeping the consumer contacts, as well as the control of the information. For TV the cooperation with an external information-broker can provide the possibility to focus on the internal processes and thus increase the quality of the information flows.

The similarity between the information-broker and streaming is that the responsibility is given to those who use the information-channels to develop services themselves. This provides the business the ability to adjust the services for their processes or needs, which in turn gives an increased flexibility regarding the creation of new businesses.

It is important that several competences participate in the discussions regarding the development of services to be able to produce the best possible design that holds over time. This will minimize the risk for the process to be drawn according to the organizational map and not from the process flow, which can make the service less generic. To make sure the service is not to be developed locally for a specific department or for a too narrow process, representatives from the receiving department have to participate at the development. This can also lead to the identification of dead-end processes and thus create this benefit as a bonus for the business.

### *Symbol inscription*

The rules and routines that are produced within the business have to be documented, in order to communicate them and thus the business to follow them (Bieberstein et al., 2006 and Erl, 2009). The produced documentation within the domain for Business process and development are meant to describe and visualize the inscription of the problematisation, see figure 16. This also provides the framework for how the business needs to change, so the action-plans regarding mobilization are carried out parallel, as well as synchronous.

The presentation of these rules and routines needs to be summarized in a simple symbol or totem according to ANT (Latour, 1998). The more recipients the simpler the symbol needs to be. In this case the symbol is the policies describing the shared routines and the incitements that support the governance within the agreed frames.

Another reason for the inscription symbol is to govern the business so the benefit from the action-plan for mobilization can be achieved, which will simplify the implementation. The domain of Business process and development can't work without being connected to the shared principles, as well as the decision process' action-plan with the decision to move forward with the proposed design.

### **6.2.3 Domain of Decision process and makers**

The third and last domain within the macro level refers to the decision process and the decision makers within the organization. This study connects the domain to three activities within ANT (Latour, 1998); compromises, action-plan growth and symbol goal. The actual decision to move forward is summarized in the decision design activity which is added to ANT, see figure 16.

### *Compromises*

Within ANT compromise is an activity for balancing the existing interests with the concerned actors for the current problematisation (Latour, 1998). A governance model is needed since the way towards services means compromises have to be done to achieve the action-plan for how and if an investment is to be realized. The purpose of a SOA-governance model is to keep the development together (which is not unique for services), in order for the investment not only to become a number of web-services or integrations (Biske, 2008). Another reason is to reduce the risk of redundant development (NASCIO, 2006). If the previous decisions have been taken

informally the process must be structured for a SOA to be able to be implemented (Windley, 2006). The governance model needs to be a familiar process within the organization, so different nets or projects don't have to argue why decisions need to be taken in a certain order. When it comes to services it is not easy to choose the most suitable model. Of the five models presented by Davenport et al. (1992) not one of them is single handedly the best.

Technical development has to a great extent been driven from the IT-department. The tendency has therefore been that IT has developed according to their needs, which can be good regarding providing order, but a technocratic utopia has therefore arisen. The organizations which still have this governance model need to open up from both IT and the business towards each other to be able to create a shared service development or architecture.

Anarchy is easy to dismiss as not suitable, this governance model arise within organizations with a high decentralization though. This can lead to the purchasers not checking with others if the service already exists, as they know better themselves, and thus develop a redundant or autonomous service. To succeed with a SOA, the ownership regarding the development and later the implemented service need to be connected to the business process-owner. Here the ownership of the service is centralized and the responsibility for the local application is still decentralized. This means, the decentralized systems receive a more natural check-point, as not to risk redundancy or not move towards the strategic goals.

The mutual check-point mentioned above needs to be as high up in the organization that feudalism don't occur, i.e. the owner of a service or information keeps it for himself. If the production of shared services is to succeed, openness towards other departments needs to be introduced. The service-development don't require that the departments within an organization must have the same system, i.e. a large mutual business system for everything. The important thing is to force the departments to start sharing information and jointly refine the information to create new business possibilities.

Monarchy means, an individual at a leading position takes all the decisions, which means the service-development decisions can be based on a single individual's interests. There will not be any dynamics in the decisions, if the affected actors jointly can't compromise for the best solution and design. Monarchy is good if you interpret the strategic plans as a monarchist decision, which will permeate decisions at all levels.

The governance process according to federalism is a time-consuming decision form, i.e. the decisions need to be anchored as high up in the organization for which the level can decide on the budget. A risk with having federalism as a model is that decisions regarding services might despite all end up at a too low level.

The conclusion of the above governance models is that none of them is perfect regarding decisions for service-developments. The choice ought to originate from the model or mix of the ones appropriate for the organization. Xue et al. (2008) points out, an IT-investment process is more complex than the final step the literature most often discuss. This study also shows that this can be applicable on service-development. A mix of them can be used if you interpret monarchy as the strategic goals, which need to be agreed upon and decided at a top-management level. The federal process is applicable in making sure the right level within the organization receives information and thus an anchorage of ideas is done. Technocratic utopianism is a strategy to be used within IT for clearly receiving the responsibility for the technology, while the business get the understanding for the liability limits, how to order functions and at what levels to place the information. This governance model fosters that IT can get control of the IT-infrastructure, without the business being able to control the solutions at a too low level. IT then has the possibility to show the benefit through the good example for others in the business and top-management.

TV practices a federal decision process, where the sponsor is formally appointed by the business as their representative. The sponsor also has the authority for decisions within the budget. The cooperation between the sponsor and the federal decision model means the decisions are anchored high up in the organization early in the process. This applies to new projects where the decisions are centralized. Within the appointed budget, though the decisions are decentralized,



which means the business can take local decisions as long as they achieve the agreed targets. This gives a risk for redundancy, where each department can govern development projects without checking if they are beneficial for the entire organization. On the other hand development can take place without the time-consuming federal process. A great issue for the newly established service-portfolio manager will be to govern this decentralized development in order to fulfill the started service-orientation.

### *Action-plan growth*

The study shows that the projects' results often are prioritized higher than the common and long-term development, which gives the risk for an ad hoc development of the infrastructure. An overall view of the organization is required for the service-development to move forward. The top-management needs thus to receive an insight that it is through coordination services get a boost. Services must be mentioned in the strategies for the common decision organs to approve deviances in project-budgets today to make future projects simpler or better. The governance must therefore originate from the top-management, which multiple respondents indicate is where services need to be marketed. The respondents consistently imply the wish to enter the hierarchy higher in the organizations, as the decision for how services can be developed is grounded there. Kanchanavipu (2008) also states that different roles need to participate at the decision, which can be appointed roles in the organization. These roles need to be connected to members of the top-management level, as they have enough authority to actually follow the changes through. This also applies for the decisions leading to a third degree of change (Sörqvist, 2004). Therefore external actors can need to participate in the decision process (Svårdström et al., 2006). The study also shows that, service-development does not progress as the business development has at a too low level affecting the decisions on which technology to invest in.

At TV the group coordinating the service-development or letting it progress towards a SOA is the integration-group, often called integration board. The integration board can provide the possibility for coordinated development. They can pave the way for single projects not needing to take all complexity into consideration, just because they are first. The individuals in the integration board need therefore have the competence and enough authority to take decisions affecting the budget and resource allocation. Regarding the message-exchange system built for traffic information, the system has a user association connected to it as an advisory role for further development. This association can summarize what this study indicates are suitable formations. It is dynamically appointed with internal and external actors, who in a structured manner discuss the common development from both the consumers as well as the internal organization's needs. This cooperation intends to give a rich picture of the situation, where multiple actors perspectives are cultivated or compromised (Checkland, 1995).

### *Symbol goal*

The solution produced to solve the problematisation, and is meant to be implemented can be compared with the symbol Latour (1998) means is the shared totem needed in order to keep a net together, see figure 16. The more actors the simpler the message or symbol needs to be. Regarding the macro-level the symbol is a parable for the action-plan for mobilization. Where the mobilization is the implementation of the design solving the problematisation brought forward by the founder. It is the decision makers' responsibility to, before the decisions are taken, verify if the agreed design fulfills the requirements stipulated from the beginning (Johansson & Jerk, 2004). The concluding part of the macro level is to decide if the design developed through compromises to solve the problematisation, will be put forward for implementation and thus represent the symbol for the action-plan.

When the produced action-plan is to be decided, the development suggestion for implementation needs to include a clarification regarding how the projects will be coordinated (Biske, 2008), and be decided if it will move towards a common goal. This also includes how the inheritance will be taken into consideration during the decision process. The respondents imply the inheritance must not impede the development. Therefore the action-plan needs to present how the organization can start at a smaller scale and adding to the service flora gradually.

## *Decision design*

The requirement producers or the purchasers of a service are those who need to have the competence regarding how the solution affects the entire organization. This does not mean they will be the decision makers for the investment's implementation. Thus they need to produce a benefit analysis regarding how it will benefit the organization, as it is in the reuse the investment-benefits arise (Lundberg, 2009). The production of a benefit-estimation needs to be done in cooperation with both IT and the business, in order to give all the actors the understanding what benefits the development intends to yield for the organization as a whole, even if it in consequence will reduce the result at another department. The respondents also imply, this part is too often underestimated and any good examples of benefit-calculation models for IT-investments or for investments in service-development don't exist. Return-on-investments (ROI) is the only one they have encountered.

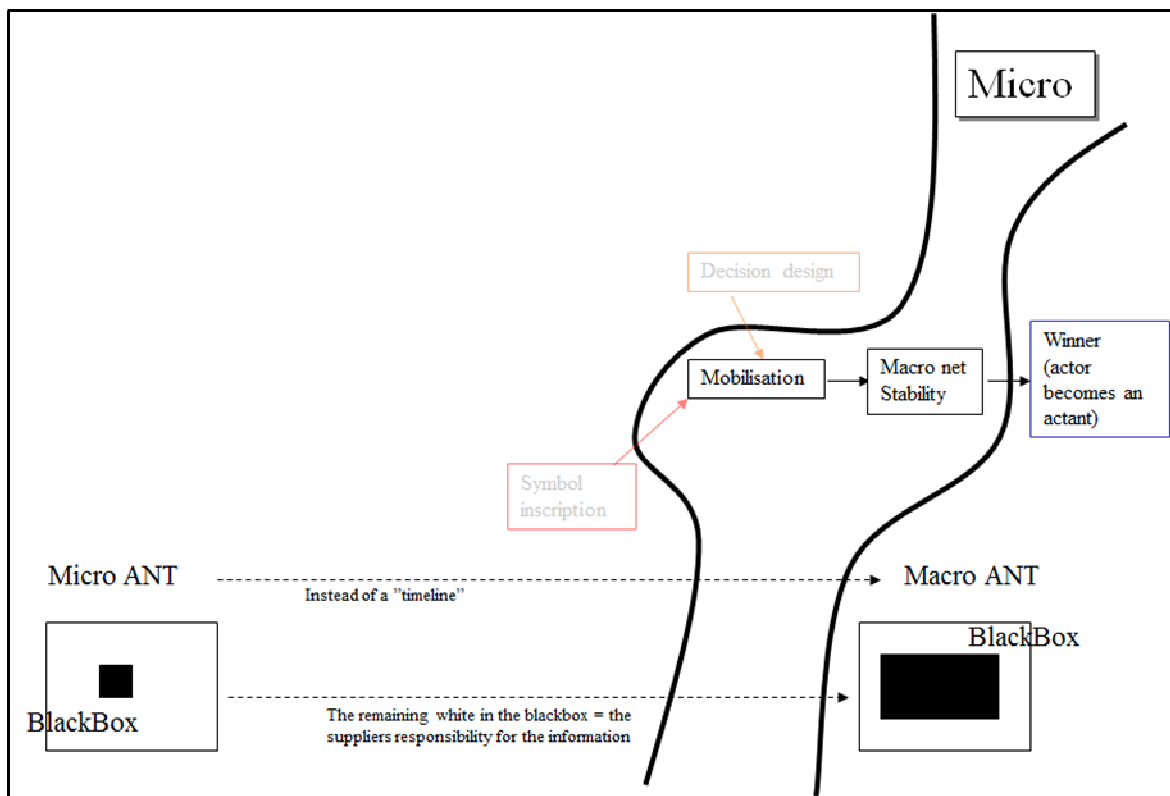
A way to communicate where the organization is headed regarding services is to market the decisions taken (Marks & Bell, 2006). This provides actors outside of IT the possibility to increase their competence regarding services, and they can understand the meaning of the decisions taken. This is important as service-development or SOA does not only mean that technology is procured, but that the processes within an organization need to be described and revised (Sörqvist, 2004). The basis for the decision to introduce a SOA is the need to document the process and that the business understands the meaning of becoming service-oriented.

Another purpose with this check-point is to see if the developed design and its action-plan are good enough for the building of the intended macro-net, as well as it can grow and become stable over time. If the decisions leads to a go ahead, the next step is to mobilize according to the action-plan (implementation) otherwise the will net be dissolved according to ANT (Latour, 1998), see figure 16.

## **6.3 Analysis of Micro**

### **6.3.1 Domain of Service-based environment**

This analysis originates from the micro-level, i.e. the level Hoffman (1988) describes as an operational level and where the guidelines are detailed and created from the result of the macro-level. From an ANT perspective this happens by describing how the mobilization occurs and how a net will move towards stability, i.e. the creation of an ANT macro-net (Latour, 1998). At the mobilization will the net's spokesperson gather the net's forces and communicate the action-plans to achieve the set goals. In this case an implementation of a service-platform, see figure 17.



**Figure 17 ANT from a micro perspective (drawn by the writers, 2011)**

### *Mobilization (implementation)*

From the domains at the macro-level different inputs are given to the micro-level, see figure 17. The domain of Shared principles provides the documentation of rules and routines. The domain of Decision process and makers provides how they are supposed to occur and which decisions are to be taken. The domain for Business process and development provides how these look like in terms of resources and implementation. The micro-level is the operational level, where the design is to be implemented, and the degree of impact is thus great. To be able to mobilize this level for growth and carry the taken decisions through, requires that the existing spokesperson is loyal to the decisions (Holmström & Robey, 2005). This also means the existing action-plans are updated and coherent to an operative environment.

At the operational organization the consumer, provider and broker will be defined and how their liability limitations are perceived (Kanchanavipu, 2008). In general these parties are described as the service-consumer being the user of the services, the service-provider publishes the service and the service-broker supplies the service. In the service-based domain the three roles will create transactions dependent of each other, and thus must be clear in respective interface and delimitations. The transaction forms a process. To create harmony with the process alignment is needed from both a business and IT perspective. Thereby, the provider will gain insight regarding the consumer and which resources will be needed in the consumer processes (Kanchanavipu). The consumer will also gain insight regarding which services the provider can offer, i.e. a form of alignment is created between these actors. The study shows the provider and broker can be closely interconnected organizationally. For example in the TV case where the broker is the IT-department and the provider is the underlying IT-systems connected to the message-exchange system. In those cases when the provider, or part of it, changes owner increases the need to clarify and decide upon the content and responsibility of the roles. In the TV case for example, the message-exchange system can move to an external actor, which creates a change in the roles and the contact-points which currently exist. For TV this means, the organization can focus instead on the internal processes and thus increase their information quality.

The service-ownership must be comprehensive compared to the ownership of a change activity as not to create redundant services (Marks & Bell, 2006). To place this ownership at IT creates a misleading technical angle at its development and maintenance, and therefore should be placed with the business in the organization. To manage the ownership at IT, indicated by this study, a central integration board is often formed. The board will have the authority to decide upon architecture and implementation. In the TV case a clear operational ownership of the external services exists, on the other hand ownerships are not appointed to the internal services. Problems with the internal services solve themselves anyhow, according to the respondents. There is a risk to reason in this way. The internal services are not visible in an organizational map and are prone to disappear at a re-organization. Furthermore the transfer of competence is something that can be missed, when those usually managing the internal processes no longer are employed in the organization.

The change leader during implementation must be governed from an organizational top-down perspective (Marks & Bell, 2006). This means, the decision to begin the service-development must come from the overlying levels in the organization. The study indicates that service-development needs to start at one point. The existing solutions or inheritance should be left untouched until there is an expressed benefit with the IT-investment to change it into a service (Ward & Peppard, 2002). The change leader needs support from a solutions architect or a role with authority to govern towards the decided design, in order to govern towards the design goals and not only develop what the consumer orders (Marks & Bell, 2006). Traditionally the consumer-orders have often been too specific to be able to be managed in a service-developed organization. This means they must indicate if specific business logic is to be implemented in software or specific hardware. There are few consumers who have the competence to place orders for a service. A pragmatic way to induce the interest and insight for the business to order services, according to some respondents, is to show the business the current integrations and thus induce the interest for service-orders. The current integrations are often something the consumer can refer to and thus build an understanding for how services work. Other partners for the change leader are the service-owner and the integration board. The service-owner has to be able to provide an overall strategic support from the business perspective and the integration board needs to support the determined IT-architecture (Bradley, 2011).

The change leader must practice its ownership by communicating with the macro-level and the current organizational level. This can be done in the form of steering group reports, or with the design group which has created the architecture (Johansson & Jerk, 2004). A tool for follow-up is for example BDN (Ward & Daniel, 2006), where the performed change activities can be presented, as well as how possible changes affect the entire chain if new IT-investments are needed. At a concluded development the meta-level must be informed about the outcome of the service-development, which can be used in a new situational analysis (Johansson & Jerk).

Multiple respondents and Xue et al. (2008) indicate that an iterative development with a quick feedback for the consumer gives the best result. The feedback can consist of prototypes or developments to be used at an overall level. From the consumer the requirements can be modified in correspondence with the reality, and even give the consumer a feeling of what is produced really provides a consumer-benefit. An empirical example to this is that TV has an expressed pilot-consumer strategy. A close cooperation with selected consumers, as TV does not have access to operational equipment at great extent themselves. This creates an alignment between the provider and consumer, which increases the understanding for the other actors businesses. Börjesson (2006) states that mobility is created with few project members, as the number of interaction-points decrease which gives a faster result. This means though, the organization is more dependent on the competence the project members have and will receive. In the long run this will create problems as the resources will be too busy and an organization can't produce the needed development. From an organization's total competence the pros and cons with few project members must be analyzed.

Internal communication regarding the service' benefit is not created from a business case (Ward & Daniel, 2006), but from the more overall benefit-map or the more exhaustive benefit-matrix (Lundberg, 2009). In the benefit-matrix the organization will create a mutual order of the different services and can communicate it visually. This will provide support for the change

leader to convince the actors which services to develop and thus create credence for the decisions taken. From an ANT (Latour, 1998) perspective this means, the spokesperson uses the produced action-plans to convince more actors to join the net and thus make it grow in size. If this fails a new net can be created, which in this case would be development of redundant services. Rich communication to the stakeholders of the change is something Kotter (1996) means lead to successful implementations. In the case of TV were the change leader and the sponsor clear regarding the expected benefit with the implementation of the message-exchange system and how it was meant to be performed. The communication took place internally through meetings with different agendas and externally where pilot-consumers participated in testing the design.

Respondent H expresses clearly which knowledge is needed for implementation of services:

*“There is a need for visionaries with domain knowledge when creating services.”*

The domain knowledge refers to the business knowledge within the organization’s industry. The respondent continues further, the technical competence to implement services based on a design decision must be included. It is also important to be able to communicate and understand the business to make a qualitatively good implementation. After the implementation a service must be maintainable and it is therefore important to meet the need for competence with the maintenance management. An example mentioned at TV’s development of the message-exchange system was the allowance of the maintenance system-management to participate during parts of the development, and thus received the opportunity to learn what the new services included.

An organization intending to implement a SOA needs to let those who know the technology participate in the decision group, since a choice of technical crossroads often occurs early in the development of the business processes (Kettinger, 1997). They are also usually also at project management. The technical choice usually induces a too great attention compared to the consumer-benefit it is supposed to yield, as well as how to develop the business process. Generally speaking the service-development in an organization must not receive a too technical focus, or be run from IT. This increases the risk the information regarding the services will remain at the IT-department (Marks & Bell, 2006). Though, it must not be underestimated that services can be good to implement for IT even if the business is not ready or want to invest in them. IT can invest in services in order to structure and control the IT-infrastructure. In turn this can lead to better flexibility in the IT-environment and higher alignment with the business. Flexibility can be created when the IT-department knows what services are developed and alignment can be created by using the existing services to a greater extent. When the technical solutions are created will they be governed from an IT-architecture with well documented descriptions of layers and interfaces between them (Newman & Friedman, 2005). This IT-architecture includes a standardization of how information is allowed to be stored and delivered. It also describes the meta-data information with definitions of master data, services and their interrelations. Most of the respondents mention it creates problems when master data is stored in several different systems with different system-owners. The consequence is that master data needs to be changed at different locations and not only in one central system.

At mergers and acquisitions the service-development-group needs to have access to employees with a collected picture of the business, in order to be able to use the new available amount of information, according to respondent H and M. At TV this means to use the information for both trains and roads, and create services with the consolidated information. These services would increase the field of application from a consumer perspective and give an increased demand and diffusion for the services. Often it is of interest to know the status of the railroad and thereafter the roads when individuals travel. If the consolidation of information is to be done internally at the state agency or to let external contacts manage them, is a decision needed to be included in the design.

Respondent O implies, when developing and selling a service the provider and consumer must speak the same language. Otherwise there is a risk for misunderstandings regarding what has been agreed upon. The misunderstandings are equally important to avoid whether it concerns sales of a service internally or externally. When it comes to sales of a service the provider must use the same linguistic as the receiving level does (Newman & Friedman, 2005). If the purchaser

is an IT-department the communication needs to have a more technical direction. If the communication is directed for the business it is the function and its benefits that is the interesting part. One respondent suggests the informational object ought to be described in the form of a packaged business-service, which means both the business and IT can understand the content. As stated earlier it has been mentioned, it is equally important the actors understand each other both internally and externally. At the internal interplay this understanding can yield the effect that IT and the business increase their alignment and thus create a higher degree of development for the organization (Marks & Bell, 2006). The understanding does not mean though that you can learn everything about the others activities (Peppard, 2007).

When implementing a new service-platform the communication must be directed internally and externally for the users of the existing services. External consumer communication can be structured through service-level agreements (SLA). In a SLA the services can be described from a technical or a more business perspective, depending on the provider's and consumer's decision (MacKenzie, 2006; Marks & Bell, 2006). In the agreement must be described how the service will be delivered, as well as the measurements for the agreed level of service. The study indicates from a provider perspective that different consumer groups can exist. The agreements can differ at the access-speed to the services and their information, and thus have different charging levels. Marketing to current consumers, does the study imply, is often done through existing channels where the existing services maintenance are discussed as well as the need for change. For TV this is done via the existing user association run by an external consumer. The meetings' agenda include deciding which change requests with the existing services and which bug-fixes to prioritize. The communication and marketing for new consumers can be performed via suitable industry forums and industry meetings, where the stakeholders are gathered and input given for new requested services. The internal communication can originate from a benefit perspective with different degrees of change (Marks & Bell, 2006). For the overall communication the benefit-map can be used where the benefit-aspects and the business areas are described (Lundberg, 2009). In this study's empirical material it has been brought forward that the benefits for the services are not communicated on a regular basis, but only when the development of a new service is done. The internal communication most often contains the technical solution of the service, and not the business process it is supposed to support. Adding the business description of the service in a business language the understanding of what the service can be used for will increase, and there with the use of it increases.

It is at the micro-level the actual work with the service-catalogues is performed. To obtain a good quality in the documentation the individuals with the required knowledge perform this task, according to respondent I. Before beginning the task to document a service how it will be performed needs to be agreed upon. Numerous respondents mention that stringent linguistics is necessary to use, for the understanding of the contents to be good. As a tool the respondents are mentioning several of the available softwares. Furthermore, the respondents are referring to the service-catalogue as the joining link for IT and the business during the service development. The respondents are also clear in the message, the language must be easy to understand and stringent, there must not be any doubt what is described. When services are documented the technical and process' needs have to be broken down into relevant levels. This is performed in order for the supported process to find the mutual points joining the business and IT (Bieberstein et al., 2006 and Erl, 2009).

If a service is to be sold it needs to be packaged in a good way, for example through a well written SLA, according to respondent O. Several respondents mean services are developed during longer co-operations, which can be interpreted as sales rarely occur for new consumers. This don't decrease the requirement for packaging since the consumer and provider need to be aware of what has been agreed upon and what respective actor can expect from the other actor. This can be seen as interfaces in ANT (Latour, 1998) where the blackbox can refer to the business secrets, or the issues that consciously or unconsciously have been identified as non-affecting. A good actor or provider of services usually have such good knowledge and experience of the industry that they can think of and develop suitable ideas or problematisations for the actors.

The study shows, the consultants often receive an order from an operational level, meaning they can't influence the design or solution already developed. This implies the consultants' competence is not used to a full extent, but only to perform the already ordered "integrations". The question to be asked is if a consultant would accept such an order, and instead make the organization aware of its design decisions (when they see that a service-development would benefit more than single integrations).

At the micro-level there is a strong dependence upon the other levels, thus the other levels have the responsibility to make decisions and also communicate them (Kanchanavipul, 2008). Where the operational work with development is to be done the communication needs to be rich from a benefit- and development-perspective, states respondent I. The benefit-perspective means there need to be a conviction and faith in what needs to be done, suitably described in a complete chain from investment to activity. The development perspective will be communicated in order to determine which method to use, the study shows that an iterative method is preferred. The technical architecture has to be well defined and contain meta-data and practical information regarding how to store and distribute the information (Newman & Friedman, 2005). The service-catalogue will be used practically at this level and will be the connecting point between IT and the business.

The ownership for this operational level must be clearly described and their interrelations stated. Descriptions need to include how the service is owned, e.g. IT-architectural ownership, process ownership and the change owners, which are the overall roles. These roles provide the competence needed to be available at the development and maintenance of the services.

### *Stabilization of an ANT macro-net*

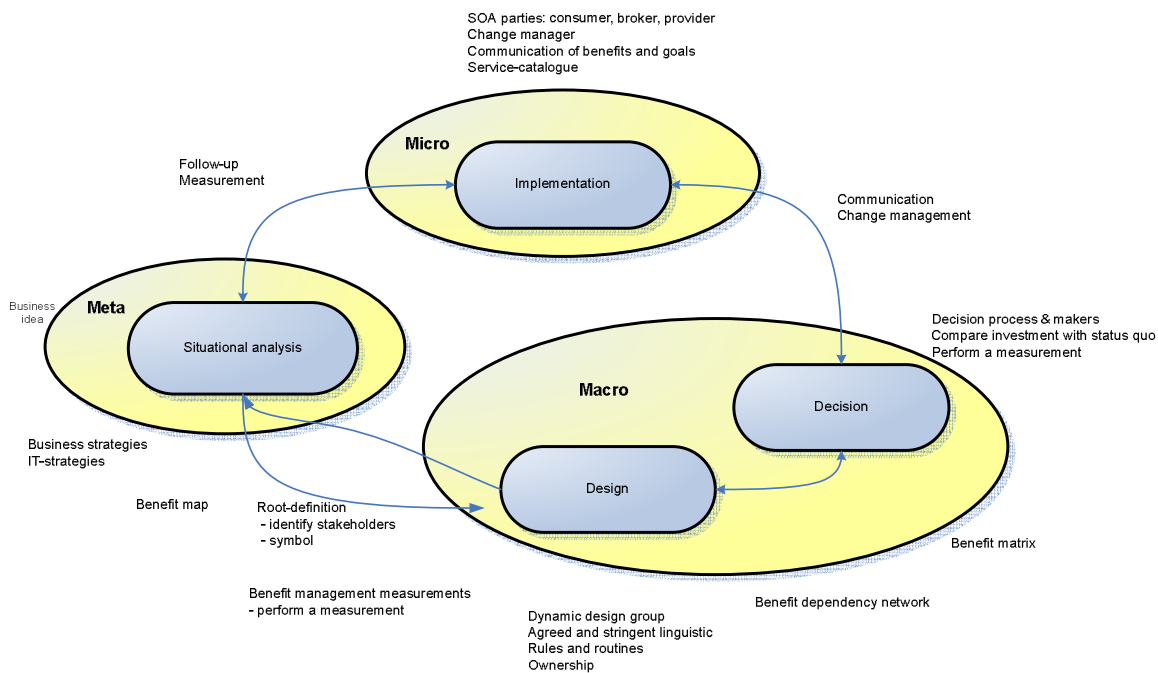
When the development of the service is completed and taken into full operation by the consumer, it is from an ANT perspective declared a winner and the actor becomes an actant (Latour, 1998), see figure 17. Becoming an actant again means stability has been reached and no more changes occur, and the actant can contribute in the creation of new nets. To contribute in the creation of new nets a service can be described according to the OASIS model (MacKenzie et al., 2006), Marks and Bell's (2006) nine categories, or as the service-spider (figure 14).

## **6.4 Summary**

The discussion will be summarized based on the SACIS models' four areas (Johansson & Jerk, 2004), see figure 8. The choice of SACIS is based on the notion of the model's suitable overall visualization of a project's life-cycle. The content in the summary is also applicable to the project model the business is familiar with. The summary is in this way done to conclude the discussion from a business perspective, and thus in a way the business is used to manage a project-cycle or development. The summary can be seen as a framework, where each organization respectively adjust each area and the detailed content to the current context.

The goal with the summary is to create a more practical view of the abstract content in a SOA. To do this with the help of a visualization and explanatory text would create this practical view, see figure 18. From the framework it is supposed to be possible to see which steps are left at an implementation, and which resources are required for completion of the problematisation-design. The framework provides support when communicating between the different levels, and can be used when marketing the services to the different target groups. Further support provided is communication regarding how a process to build services looks like for external actors, and internally how the governance of the service-development is intended to work. In the framework the liability limitations is described, as well as how each step in the development of a service is dependent on the former and next activity.





**Figure 18 Summary of an emergence of a SOA (drawn by the writers, 2011)**

### *Situational analysis*

From the business idea and its following strategies a situational analysis is performed, see figure 18. To find the gap between the current situation and the strategic goals, i.e. answer why a change needs to be carried out. The top-management, which in the study is connected to the meta-level, produces the business and IT strategies (Hoffman, 1988).

To identify the gap the organizational goals can be analyzed with a benefit-map (Lundberg, 2009) and thus at a high level identify the areas where the benefit can be achieved. This analysis needs to be done for both the business and IT strategies, both together and separately. These three analyses provide the stakeholders a possibility to clarify which benefits are most beneficial for the entire organization. They can also contribute for the whole and thus facilitate a better alignment between the business and IT. The benefit map can also be used as a communication tool to visualize where and why the benefits can arise (Lundberg).

The outcome from the gap analysis will form the foundation of the problematisation or root-definition, showing what needs to be changed to be able to reach the strategic goals. To reach out to the identified stakeholders, outside the top-management, the root-definition has to be presented in a simple way, i.e. a simple symbol (Latour, 1998). The root-definition must not only present the vision, but also include the measurement for how the investment-benefit can be measured and when it is meant to be measured. These measurements can also be used to revise if the benefit aspects of the root-definition are still valid, i.e. if it is suitable to be approved to progress to the design phase. A first measurement needs to be performed when the root-definition is handed over for design, as an originating value reflecting the present needs to exist. During the project cycle the measurement also needs to be tested for relevance and if it needs to be updated.

The study indicates, top-management needs to be more involved in the service-development than before. It is as early as in the situational analysis and the strategic goals the foundation for if and how services can be introduced. Top-management also needs to have the understanding that developed services will be a part of the infrastructure, and thus can be expensive to invest in. This is why it is important the infrastructural investments are governed from the strategic plans, as not to risk the single projects control the long-term development or a single project should not have to manage that strategic issue. In the root-definition top-management needs to identify how and where the organization is affected from its current structure. How the organizational architecture is affected is also identified at the situational analysis, as well as the potential



changes needed to be done (Opengroup, 2011). The study reveals that knowledge at this level regarding services and their organizational influence is low. To increase this knowledge the competence needs to be increased. The competence can increase through education or with the presence of an external party, at the strategic discussions, who shows how services can support the goals to be reached.

## *Design*

The macro-level includes the design and decision step in the SACIS model, see figure 18, containing questions regarding what the change will include and what it affects, as well as the planning of the implementation. A factor pointed out by several respondents and also the theory (Lanzara & Patriotta, 2007) is the importance of dynamics in the group to obtain several perspectives in the discussion, in order not to risk that single interests influence the design. When numerous areas have participating representatives, they can jointly better discuss the root-definition. If there are unclear issues the dynamic group can suggest improvements for the purchaser and thereby create a natural and iterative process between the meta and macro-level.

The study gives that agreed and stringent linguistics is important to facilitate the communication and the shared understanding, as the design should only be developed in cooperation between the business, IT and other recipients. The task to control the discussions from the stakeholders expectations and personal goal should preferably be driven by an independent party (Johansson & Jerk, 2004), where the result will be a compromised action-plan and goal. This party has the responsibility for not letting the discussions be long-winded, so the prerequisites valid at the root-definition have changed and thus need to be revised.

The decision-foundation for the design needs to contain how the service is meant to be used within the developed business process, i.e. the inscription or rules and routines must be determined and documented. Marks and Bell (2006) mean, the different fields of application of the service must be described in a business part, as well as an IT part. Another important part of the design is to suggest where the ownership for the new service best is connected both in the current and in the possibly new organization. The ownership for the activities required for implementing the design must also be appointed. They must according to BDN (Ward & Daniel, 2006) be connected to the individual having the authority to carry out the change. The connection to owners for both the service and change activities provides the recipient of the design to receive an increased participation, as well as the design is anchored early within the business.

## *Decision*

The material and action-plan produced during the design phase need to be adapted depending on how the organization's decision process looks like, and which decision makers are participating. The study indicates, the appointed group for decisions regarding services needs to together have the competence to foresee the consequences of a decision from multiple perspectives.

The decision makers need to have enough competence to be able to see if the design is sustainable for implementation, i.e. have the insight it is according to the strategic goals. The content of the design needs to be performed in a way that the decision makers can receive the understanding of how a decision affects the organization.

A part of the decision making is to compare the proposed design and its affect, with the current situation, i.e. compare that the benefit with the investment is higher than remaining at status quo. If the benefit or the consequences are not visible or the prerequisites have changed since the root-definition was formed, it will need to be remitted to the design group or even to top-management. One step in the benefit estimation is to divide the activities based on if they are to yield a financial or a qualitative benefit (Lundberg, 2009). This classification is then transferred into a benefit-matrix to visualize the resource-requirements to reach the direct or indirect benefit within the placed order.

Johansson and Jerk (2004) means, it is in this step the consequences for the actors in the organization are to be revised. This study is though implying the analysis must therefore be a part of the design step.

A part of the decision making is to perform a measurement with the measures agreed upon during the root-definition, see figure 18, to obtain a new value before the implementation. This measurement will also indicate if there are other factors affecting the measurements during the project, or if the measurements need to be revised.

### *Implementation*

The third level, micro, will answer the question when, i.e. when in time the change activities actually will be performed based on a project plan. It is at the micro-level the actual work with the change of the organization takes place, i.e. the implementation of the design (Johansson & Jerk, 2004). What and how the organization are to change is given from the macro-level, which from the design decision are transformed into an order, see figure 18.

The operational level of SOA consist of three actors; consumer, broker and provider (Kanchanavipu, 2008). The three actors are dependent of each other, to be able to function smoothly their liability limits need to be defined and agreed upon. Organizationally the provider and broker are usually located within the same organization. If the broker is used or moved externally this will affect the organization to a great extent, since the ownership of the information and the contact with the consumer most often follows the broker.

If one of the three actors is located in another organization the communication and knowledge need to look different, than if they are located within the same organization. After the decision to go ahead with the design the work for the change owners of the activities will start. They have the responsibility within their activity to coordinate the three actors' interests and development. What to communicate for the three parties and how to govern the change activity must be clear for the change owner. An example how to document this is the service-spider at TV (see figure 14), which is a simple symbol for communication. It falls on the change owner to report the progress of the activities and possible deviances from the plan set to the purchaser as it might affect other activities. It is important to continuously update the BDN (Ward & Daniel, 2006) with the status of the activities. This will visualize progress of the activities, as well as show how the change of the content of the activity affects the entire investment. It is the change owners' responsibility to make sure the activity is governed according to the agreed rules and routines with the design as the goal.

Another important part of the implementation is to communicate the benefit and goal of the design, as to induce the recipients' interest. The benefit-matrix, produced before the decision, can be used for this purpose and may give the recipients the understanding what the investment covers of the total vision. It is the change owners' responsibility after a completed activity to make sure a measurement is performed according to the root-definitions' measures, to make sure the direct benefit the investment was expected to yield also has been achieved.

The different actors working with the development of services need to use the agreed linguistics to avoid misunderstandings. To communicate between the different stakeholders, the documentation of the agreements regarding services performance must be described. The actual work to introduce and update the service-catalogues needs to be completed. The services must be documented at a relevant level, i.e. both at a technical level and its corresponding business level.

## 7 Conclusion

The purpose of this master thesis was to illustrate the emergence of a service-oriented architecture (SOA) from a business perspective. The thesis is based on the following research question with its complementing sub question:

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

*What do different decision levels need to consider in the process of developing a SOA?*

The study's research question has been answered with the ANT (Latour, 1998) procedure. A development begins with a problematisation, and grows through mobilization from a micro-net and is completed when the winner is selected and the design is adopted by everyone, i.e. the design has evolved to a stable macro-net. The study shows, the meta-level refers to the overall analysis for identifying the gap between the strategic goals and the current situation. Within the macro-level it is set how the shared development processes are to be performed, which form the frames for how the design will develop and its content. The micro-level refers to the operational work when implementing a SOA.

The study emphasizes three areas needed to be considered at the implementation and an emergence of a SOA depending on which decision level they belong to. The three areas are: ownership, communication and competence.

- Regarding ownership the study reveals clearly, the need to be connected to both a strategic and an operational level, to receive the dynamics of the perspectives bringing the emergence of services forward. With the ownership, the responsibility and authority needs to be clear for all actors. The owner is responsible for the completion of the activities within the level. The ownership needs to be connected to the business and the IT processes as well, in order to facilitate a balance between the actor-groups interests. This facilitates for the consumer to know who is the discussion-part regarding different issues, regardless if it is an internal or external consumer.
- Communication can be seen from two perspectives: firstly from each decision-level respectively, and secondly from the communication of the benefit aspects for the entire organization. A support for this communication is the documentation for the designs decided to be implemented. The degree of details increases between the levels from meta to macro, and from macro to micro. The study indicates the strategies from the meta-level need to be held short. The macro-level include the shared documentation regarding how a SOA will emerge, what a service is expected to contain and be able to perform, i.e. the architectural design of a SOA. Within the micro-level, a service-catalogue can be used as the shared contact point between the consumer and provider, facilitating the broker to transfer the information. Since the business needs, together with IT, manage the development of services, the work is supported if the actors decide and use shared linguistics. The study also implies that the linguistics needs to be clear and stringent.
- When discussing the development of a SOA it is important the actors know which requirements are set at the level they belong to, since the higher level form the foundation for the next level. The study shows, that development of services often emerge bottom-up since the competence with top-management is not as high as it can be. Regarding development of the shared framework for services the participants in the discussions need to represent different areas in order to receive a good and dynamic decision foundation. It is

important the representatives from the operational level, both from the business and IT, participate. The actors may then assimilate the knowledge regarding the service as early as possible, which facilitates the implementation. When appointing the participants of the discussion groups it is important to have the understanding that each actor-group respectively are not able to learn the other actors' entire operations. They will only obtain an understanding for their business and its needs.

### ***Practical contribution***

Some practical contributions will be presented below, to provide the business with an increased understanding for which affect a SOA-approach can yield. These may of course be used together with the abovementioned conclusions.

- There are interfaces between different levels within an organization regarding the liability areas and contents. To facilitate the information flow and provide shared decision foundations communication is essential. The implementation and usage of a service-catalogue interconnects the business and IT, to increase the understanding for the actors' needs and thus facilitate an expansion of the SOA.
- The respondents in the study all agreed upon that the services ought to be developed incrementally, as radical or development-projects with a large scope often have problems to complete the task. Further it has been brought forward, that it is better to begin the work to implement services at a given point, and then expand the SOA gradually.
- For a SOA to be implemented in practice, its development-process needs to be structured after a project-model the organization is familiar and comfortable with.

Before the work to implement a SOA begins the organization must understand: service-oriented architecture is not only technology, it is an approach for business development with the support of IT-solutions.

### ***Future research***

At the completion of the study, three topics for future research have emerged:

- The first has an academic approach, where the research could explore deeper within the subject: communication between IT and the business, regarding linguistics and documentation of descriptions. Since IT with its technical background often has problems interpreting the abstract description a business strategy is, and translating it to how IT-services can support the business.
- During the study it was brought forward that there are no conventional benefit calculation models for services with multiple dimensions, to be able to cover estimations and measurement of the entire organization's benefit.
- The third suggestion is adapted for industrial research and means to verify this study's practical contribution for businesses. To empirically investigate if the contents of the decision levels correspond with an actual implementation of a SOA.

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## 9 Appendix – Interview questions

### 9.1 Interview set 1

	Dåtid	Nutid	Framtid
<b>Business</b>	<p>Hur hanterades kundens förfrågan internt från första initiering till slutgiltig implementation av UTIN? – Ansvar, vem, när?</p> <p>Varför valde man att införa UTIN?</p> <p>Hur finansierades utvecklingen av UTIN?</p>	<p>Hur hanteras önskemål kring utveckling av funktioner för UTIN av nya och befintliga kunder?</p> <p>Hur finansieras utveckling av UTIN?</p> <p>Vilka ser du är UTIN:s kunder/användare?</p> <p>Vilka är UTIN:s kunder?</p> <p>Hur hanterar ni gemensamma och enskilda kundkrav på UTIN?</p>	<p>Hur ser du att utveckling av den tjänst som UTIN utför bör finansieras?</p> <p>Vilka ser du skulle vilja använda de tjänster UTIN tillför i framtiden?</p> <p>Hur påverkas UTIN av IT-strategi?</p> <p>Hur ser ni att både gemensamma och enskilda kundkrav på UTIN bör hanteras?</p>
<b>Teknik</b>	<p>Hur utvecklades UTIN, tekniskt?</p> <p>Varför valdes den plattformen/egen utveckling? Vad var alternativen på marknaden?</p>	<p>Vilka tekniska integrationer finns till UTIN? – Varför finns dessa tekniska integrationer?</p> <p>Hur sker överföring av information från ”rfid stationen” till kund?</p> <p>Hur ser ansvaret ut vid incidenthantering?</p>	<p>Hur ser planen för teknisk utveckling av UTIN ut? Var och hur tas besluten kring detta?</p>
<b>Organisation</b>	<p>Vem ansvarade för UTIN?</p>	<p>Vem ansvarar för UTIN?</p> <p>Hur ser en systemförvaltningsorganisation ut för Banverket och för UTIN?</p>	<p>Vem ser du bör ansvara för UTIN i framtiden?</p>

## 9.2 Interview set 2

Område	Intervjufråga
<b>Koncept förklaring</b>	<p>Vad är en tjänst inom BV?</p> <p>Hur ställs kravställningen för en tjänst?</p> <p>Vilka attribut behöver en tjänst ha för att kunna kallas för tjänst inom BV?</p> <p>Har TV något officiellt uppdrag att skapa nya tjänster?</p>
<b>Beslut / finansiering</b>	<p>Hur fungerar en beslutsprocess idag rörande en tjänst både rörande verksamhet, respektive IT?</p> <p>Hur beräknas Business värdet av en tjänst?</p> <p>Har ni några modeller för både verksamhets- och IT-investeringar?</p> <p>Hur räknar ni på nyttan av en tjänst och hur sker uppföljning av nyttan? Finns det nyckeltal för att beräkna businessvärdet?</p>
<b>Kund</b>	<p>Hur marknadsförs en tjänst inom BV? Hur ser ni på försäljning av en tjänst?</p> <p>Hur involverad är kunden vid en tjänsteutveckling? Finns det pilotkundsstrategier?</p> <p>Hur hanteras motstridiga krav från olika kunder?</p> <p>Tecknas det SLA med de kunder som använder TV:s tjänster? Vem är i så fall den interna ägaren av dessa SLA?</p>
<b>Implementering</b>	<p>Hur uppkommer en ny tjänst inom BV? Bottom-up, top-down, kunddrivet? Finns det några fora för tjänsteutveckling inom järnvägssektorn?</p> <p>Hur flexibel ska en tjänst vara, eller hur flexibel anser du en tjänst ska vara?</p> <p>Vid utveckling av en ny tjänst vad har man för strategi? Försöker man sträva efter att hitta kända tjänster/produkter på marknaden eller egenutvecklat?</p> <p>Hur ser det historiska arvet från SJ-tiden ut i ett tjänsteperspektiv?</p> <p>Hur planeras/struktureras införandet av en tjänst?</p> <p>Vid framtagande av en tjänst, arbetar ni parallellt med olika tidsperspektiv?</p> <p>Hur ser du att befintlig IT-miljö och verksamhetsprocesser påverkar möjligheten att införa en ny tjänst?</p>
<b>Organisation</b>	<p>Vem är ägare av en tjänst?</p>

	<p>Hur fungerar vanligtvis ett samarbete mellan IT- och företagsledning?</p> <p>Vad gör Integrationsgruppen? Vad är uppdraget och vad har de för beslutanderätt? Hur interagerar de med systemförvaltningar för källdata?</p> <p>Vilka gränssnitt finns mellan nätverk? Både för process/business och för tekniska frågor?</p> <p>Hur ser man på nätverk inom BV? Både de mänskliga och de tekniska. Brukar det uppstå några dolda agendor? Vilka risker ser du med nätverk?</p> <p>Hur kommunicerar ni vid uppbyggande av en tjänst? Både internt och externt. Hur kommunicerar ni på olika nivåer inom organisationen (operativt, strategiskt)?</p> <p>Hur fungerar vidareutvecklingen/förvaltningen av tjänster?</p> <p>Var ser du att underhåll av en tjänst ska ske? Fungerar det bra idag?</p>
<b>Strategi</b>	<p>Hur arbetar ni med IT-strategi? Finns det någon integrationsstrategi?</p> <p>Hur påverkas utkomsten av att "rätt" personer är med i uppbyggnaden av en tjänst? Vilka roller ser du ska vara med i framtagandet av en tjänst? Bildas det tvärfunktionella team inom TV vid dessa tillfällen?</p> <p>Vilka aktörer arbetar kring SOA och/eller integration? Både utifrån teknik och verksamhet.</p> <p>Hur ser du att tjänster fungerar inom BV? Finns det någon kritik/risker/farhågor mot att köra det fullt ut?</p> <p>Betalning av tjänster - hur ser TV på detta?</p> <p>Hur styrs järnvägsdelen inom TV?</p>

### 9.3 Interview set 3

Område	Intervjufråga
<b>Konceptförklaring</b>	<p>Vad gör er organisation?</p> <p>Hur ser du att en tjänst ska definieras?</p> <p>Vilka attribut behöver en tjänst ha för att kunna kallas för tjänst?</p> <p>Hur ser din roll ut inom organisationen?</p> <p>Hur ser du att tjänster kommer utvecklas inom de närmaste 3-5 åren?</p> <p>Hur ser processen ut för att ta fram en tjänst? Hur brukar ni arbeta, har ni någon modell?</p>

<b>Strategi</b>	<p>Brukar företagsledningen ha satt upp några mål för tjänsteutveckling?</p> <ul style="list-style-type: none"> <li>- om ja, hur brukar det se ut?</li> <li>- om nej, varför inte?</li> </ul> <p>Hur ser du att man bör arbeta med strategier inom en organisation för att kunna utveckla bra tjänster?</p> <ul style="list-style-type: none"> <li>- har du bra exempel på att göra en strategi levande?</li> </ul> <p>Hur fungerar en beslutsprocess idag rörande en tjänst både rörande verksamhet, respektive IT?</p> <ul style="list-style-type: none"> <li>- Vilket mandat har de grupperna som tar fram en tjänst?</li> </ul>
<b>Nytttoberäkning</b>	<p>Hur ser ni på nyttoberäkning av en tjänst?</p> <p>Hur beräknas det?</p> <ul style="list-style-type: none"> <li>- hur styrande är nyttoberäkningen?</li> </ul> <p>Vad ser ni för risker med en tjänst?</p> <ul style="list-style-type: none"> <li>- integration</li> <li>- beroenden</li> <li>- ekonomi</li> <li>- mänskliga</li> </ul>
<b>Kommunikation</b>	<p>Hur ser ni på marknadsföring av en tjänst internt?</p> <p>Hur ser ni på marknadsföring av en tjänst externt?</p> <p>Hur involverad är motparten i tjänsteutveckling?</p> <ul style="list-style-type: none"> <li>- generellt</li> <li>- vid ex. en helhets lösning från er sida.</li> </ul> <p>Hanterar ni några tredjeparts önskemål?</p> <ul style="list-style-type: none"> <li>- om ja, hur</li> </ul> <p>Hur brukar SLA hanteras gentemot tjänsteutnyttjarna?</p> <p>Vad brukar en SLA innehålla? (Ekonomi, tider.)</p> <p>Hur vanligt är det att skriftliga respektive muntliga SLA överenskommes?</p>
<b>Organisation</b>	<p>Hur brukar projektgrupper inom tjänsteutveckling hos kunden bemannas? Vilka kriterier brukar vid sammansättningen?</p> <p>Brukar initiativen till nya tjänster vara top-down eller bottom-up?</p> <p>Hur ofta brukar verksamhetspersoner medverka? Vad brukar deras roller vara? (Gisslan)</p> <p>Hur brukar samarbetet mellan aktörerna sättas upp?</p> <p>Hur flexibel ska en tjänst vara, eller hur flexibel anser du en tjänst ska vara?</p> <p>Vid framtagning av tjänster, går ni på egen linje eller gör ni benchmarking av vad som finns på marknaden?</p> <p>Vad är din erfarenhet att det historiska och traditioner inom en organisation påverkar framtagandet av tjänster?</p> <ul style="list-style-type: none"> <li>- både på kort och lång sikt?</li> </ul> <p>Hur planeras/struktureras implementeringen av en tjänst?</p> <ul style="list-style-type: none"> <li>- brukar det finnas planer med olika tidsperspektiv?</li> <li>- om ja, har de olika detaljeringsgrad?</li> </ul>

	<p>Vid framtagande av en tjänst, arbetar ni parallellt med olika tidsperspektiv?  Vid framtagande av en tjänst, har ni planer med olika detaljnivåer?  Om ja, till vad används dem? (Ex. kommunikation till olika intressentgrupper.)</p> <p>Vem brukar bli ägare av en tjänst?</p> <p>Hur ser förvaltning ut av en tjänst?  -både vidareutveckling och underhåll.</p> <p>Hur sker reklamation, eller incidenthantering ut av tjänsten?</p>
<b>Teknik</b>	<p>Hur styrande är tekniken och teknikvalet?  Hur ser du att tekniken kan vara styrande för utfallet av tjänsteutvecklingen?</p> <p>Vad brukar du förorda, integrering eller differentiering vid framtagande av tjänster?</p>

## 9.4 Interview set 4

Område	Intervjufråga
<b>Konceptförklaring</b>	<p>Vilken roll ser du att ANT kan spela vid införande av tjänster?</p> <p>Hur ser du att ANT spelar vid diskussion om organisationsteori om man går mer mot nätverksorganisationer?</p> <p>Finns det en enhetlig bild av hur ANT är tänkt att fungera? Ex. modell</p> <p>Kan en sammanfattning av ANT vara att hålla frågan och lösningen enkel?</p> <p>Gemensamt drag: för att ett nätverk ska fungera måste de ha gemensamma och liktydiga benämningar hos de interagerande aktörerna. Är referenten korrekt uppfattat det centrala i ANT?</p>
<b>Grenar inom ANT</b>	<p>Hur ser du att Latour förespråkar ”fiktions” för att förklara vetenskap?</p> <p>Latour pratar mycket om tingens motsatser på vilket sätt är det ANT's grund?</p> <ul style="list-style-type: none"> <li>- ex. relativitet gentemot relativism.</li> </ul>
<b>Tjänster och ANT</b>	<p>Inom IT-infrastruktur använde vi ANT för förståelsen socio-teknik, att infrastruktur handlar inte bara om hårdvara och kablar utan lika mycket om regler och sociala koder. Hur ser du att ANT kan bidra vid uppkomst och införande av nya tjänster i befintliga organisationer?</p> <ul style="list-style-type: none"> <li>- respektive uppstartsbolag?</li> </ul>