

IMPACTS OF SERVICE ORIENTED ARCHITECTURE (SOA)
ON ENTERPRISE SYSTEMS AND ORGANIZATIONAL STRUCTURES

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IMPACTS OF SERVICE ORIENTED ARCHITECTURE (SOA)
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Thesis Abstract

Ihsan Birekul, “Impacts of Service Oriented Architecture (SOA) on Enterprise Systems and Organizational Structures”

In today's fast-paced global economy, organizations need to be focusing on becoming agile and flexible enough support dynamically changing business requirements in this on demand environment. One of the most critical steps towards this objective is aligning IT systems using service oriented architecture (SOA) to enable end-to-end business process orchestration and enterprise integration. On the other hand, the real value of SOA will be realized when SOA overarches technology and is extended to improve the organizational structure and behavioral model of the organization as successful SOA implementations require cooperation and involvement on many levels. In this paper, the possible changes needed to be introduced during SOA transformation will be examined in detail. Initially a description, main concepts and challenges of SOA will be briefly explained. Then, the changes to be introduced in the organizations will be provided. Finally, the results of the analysis performed on the collected survey data will be presented.

Tez Özeti

İhsan Birekul, “Hizmet Yönelimli Mimarinin (HYM) İşletmelere ve Organizasyonel Yapılara Etkileri”

Global ekonominin hızla değiştiği günümüzde, kurumlar iş dünyasının sürekli değişen gereksinimlerini karşılayabilmek için yeterince esnek ve çevik olmak zorundadırlar. Bu amaca ulaşabilmek için atılacak en önemli adımlardan bir tanesi de bilgi teknolojileri sistemlerinin hizmet yönelimli mimari (HYM, ing. Service Oriented Architecture (SOA)) kullanılarak tekrar düzenlenmesidir. Bu şekilde kurum, uçtan uca akışların sorunsuzca yürütülmesini ve kurum genelinde entegrasyonu sağlamış olacaktır. Ancak, HYM'nin gerçekten başarılı olabilmesi için kurum HYM'yi sadece teknolojik bir değişiklik olarak görmemeli ve kurumun organizasyonel ve davranışsal yapısında da değişikliklere gitmelidir, zira başarılı HYM dönüşümleri kurum içerisinde birçok seviyeden kişinin katılımını ve birlikte çalışmasını gerektirmektedir. Bu araştırmada, HYM dönüşümleri sırasında kurum yapısında gerçekleşmesi muhtemel değişiklikleri detaylı bir şekilde irdelemek amaçlanmıştır. Bunun için öncelikle kısaca HYM tanımı, temel kavramları ve zorlukları üzerinde durulacaktır. Daha sonra kurumda yapılması öngörülen değişiklikler açıklanacaktır. Son olarak da anket ile toplanan veriler üzerinde yapılan analizlerin sonuçları sunulacaktır.

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CHAPTER 1

INTRODUCTION

Background

Without a doubt, many modern enterprises today heavily depend on their IT systems. Because of this dependence, IT is driven by the dynamics of the enterprise itself. Enterprises have high expectations from enterprise IT like having high level of flexibility and agility.

When it was first introduced in the enterprises, IT was mostly responsible for storage and processing capacity without having business logic. By time, more and more business logic have been added to IT applications in the previous 20 years that made them a part of the business itself. As IT is a part of business today, changes in the requirements of business and the need to develop new functionalities also requires changes in the IT applications, which forces enterprises to reuse existing components efficiently to be able to reduce the costs (Krafzig et al, 2004)

Now imagine a car manufacturer designing all the parts of the car in a way to not let it be possible to replace a single part without replacing the car wholly. After trying to adapt IT to business processes during previous 20 years in many different ways, the state of the business processes of many organizations are like the cars of this fictional manufacturer. These organizations have applications to support the operations of these monolithic systems that are very difficult to replace piece by piece. The replacement becomes more of a problem if the organization uses cross-functional enterprise software

packages. For instance, they might require ridiculously high amount of time and money for replacing a simple pricing calculator.

Fortunately, it is becoming possible to design many business activities as Lego-like software components that can be easily put together and taken apart. This is achieved thanks to service-oriented architecture (SOA), a new way of designing and implementing the software components (Merrifield et al., 2008). Service-oriented architecture is a remarkable evolutionary step for technology world especially to help it to fulfill one of its greatest unfulfilled goals. This goal is to have the ability to connect a wide variety of systems without proprietary software (Pulier and Taylor, 2006).

SOA intends to create a services platform consisting of many services that are elements of business processes that can be combined and recombined into different solutions and scenarios, as determined by business needs. This capability of SOA to integrate and recombine services helps the organizations to have a closer relationship between business and IT. Moreover, it provides to organizations the flexibility to address new situations (Bieberstein, 2006).

It is clear that aligning IT systems by the help of service oriented architecture is a very critical step to enable end-to-end enterprise integration and virtualized IT services, especially in today's fast-paced global economy where organizations should be flexible and agile to support dynamically changing business requirements in this on demand environment. On the other hand, to be really effective, SOA should be overarching technology and needs to be extended to transform organizational structure and the behavioral practices of the organization (Bieberstein et al., 2005).

Problem Statement

SOA implementation are getting more and more widespread in large enterprises all over the world, and organizations are showing a greater interest in adopting SOA to take advantage of services provided by different sources. SOA transformation is more than just being a technology change (Tews, 2007). Many people agree that SOA also requires change in the organizational structure (Havenstein, 2006).

However, most companies that have started SOA adoption have applied it without considering the option of re-designing of their businesses as a first step. Having omitted this option, they have disregarded SOA's greatest value which is the opportunity to re-design the organizational structure to make it much more focused, efficient, and flexible (Merrifield et al., 2008).

Research Objective

The objective of this research study is to find out what kind of organizational changes are required during SOA transformation and how it is related with the success of the new architecture.

CHAPTER 2

WHAT IS SOA?

Definition of SOA

The term SOA is an acronym for Service Oriented Architecture. This is the point where the debate starts (Moore, J., 2007).

There are several ways to look at the concept of SOA (Bieberstein, 2006). Many of the standards organizations (W3C, DMTF, and OASIS) tried to make a definition of SOA and attempted to make this definition as the real definition of SOA (Juneja et al., 2007).

SOA is the newest approach for designing, implementing and integrating reusable software components, which is offered to organizations as a new technological framework (Saran, 2006).

Existing integration software vendors like WebMethods, IBM and Tibco Software have changed their approach and started to use web services as technology as they take on SOA. As the market has grown, large vendors such as IBM, Microsoft, Oracle and SAP started to offer SOA products and services (Moore, J., 2007).

According to OASIS a reference model consists of “a minimal set of unifying concepts, axioms and relationships within a particular problem domain, and is independent of specific standards, technologies, implementations or other concrete details.” (OASIS, 2006)

The definition given by OASIS in SOA-RM is “Service Oriented Architecture (SOA) is a paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains.” (OASIS, 2006)

Following are some of the other possible definitions focusing on business or technology aspects:

- *A business definition:* A set of business, process, organizational, governance, and technical methods used to put an end to the debate between IT functions and find out the business value of IT, and to create an agile business environment for competitive advantage (Bieberstein, 2006).
- *Another business definition (introduced by IBM):* A service-oriented architecture is a collection of secure and standardized components (services) which are reusable and can be used together to address changing business priorities that helps to increase the flexibility to use the elements of business processes and the underlying IT infrastructure (Crawford et al., 2005).
- *A technical definition:* SOA is an IT architecture that mainly focuses on loose coupling and reusability among the interacting software components (Erickson and Siau, 2008)

History of SOA

The idea of SOA appeared in 1990s, when people realized the need to communicate different systems as a result of inefficiencies of mainframe hardware. Since then, integration solutions evolved as follows:

- TCP/IP for network communication

- Open standards like DCE (Distributed Computing Environment) and RPC (Remote Procedure Call)
- Object Oriented Programming (OOP)
- Inter-application communication based on OOP, Corba (Common Object Request Broker Architecture) and DCom (Distributed Common Object Model)
- Enterprise application integration (EAI)
- Success of Java and Web Concepts
- The biggest step towards SOA, Web Services
- And finally SOA, which is actually an logical extension of web services as it is considered as an architectural design style for assembling web services into high-level applications (Saran, 2006).

Elements of SOA

A SOA has many different elements which are needed to be considered to build a SOA.

The list below shows the essential ingredients of a successful SOA:

- Conceptual SOA vision
- Services
- SOA governance and policies
- SOA metrics
- Enabling Behavior (Marks and Bell, 2006)

For the sake of the organization's processes, it is required to have enterprise architecture and a SOA vision. The organizations should set their goals in terms of the way they want their processes to function and where they want to see their organizations

at some point in time. Organizations should focus on business aspirations and clearly define the operating principles, which will then become a strategy for SOA goal. A strong governance model is also considered as a critical step for SOA success. In short, the aim of the conceptual SOA vision is to define the target state of the SOA which is the goal of the enterprise to be achieved over time (Moore, C., 2005).

Recent surveys conducted on several different industries presented that many of the medium and large enterprises have already implemented SOA, and many other are planning to adopt one in near future. Main reason for this is the need for the seamless integration of internal applications. SOA's offer is a new way to system design that makes it possible to expose resources on a network as standalone components called "services" (Joseph, 2006). Services are considered as the central artifact of an SOA (Marks and Bell, 2006). Services can be accessed regardless of the programming language used for development or the platform on which the service runs. Even though it is possible to use several different technologies to form services, the most popular and promising one is Web Services (Joseph, 2006).

Governance is a collection of policies those are created and managed to be able to affect and enforce the actions and behaviors which are straightly related to business objectives (Oracle Corporation, 2007). SOA Governance is important and needed to be able to make sure that different development teams will focus on to fulfill the single SOA vision (Marks, July 2005).

SOA Metrics are necessary to let the organization know the current position and the direction of SOA initiatives. To put in differently, it can be said that SOA metrics is the steering wheel of the organization's SOA. Metrics are usually started to be discussed

in late stages of SOA initiatives as initially the focus is to finalize the implementation successfully (Marks, July 2005).

Organizations have to spend some time for planning a behavioral model to make sure that SOA initiative will be successful. The planning needs to be started with the behavior of SOA which will enable the organizations to reach SOA business goals. These behaviors are behaviors to lead the organization to service reuse, SOA conformance, governance and metrics (Marks, July 2005).

Key SOA Concepts

Following are considered as the main concepts that business executives should take into account while assessing the potential value of SOA:

- Ease of Integration (Keller, 2006)
- Software (Service) Reuse (Keller, 2006)
- Business Agility (Holtschke, 2006)

In past, the need to adapt to new technologies forced enterprises to create a variety of systems, which resulted in heterogeneity in their environment today. This heterogeneity used to bog us down with lack of interoperability. With SOA, it is possible to create solutions that are portable and interoperable using the existing systems which are actually isolated systems by the help of open standards. Starting point of open standards supporting interoperability is web services.

SOA enables the creation of applications built as a combination of loosely coupled and interoperable services. Interoperability is provided based on a formal definition (like WSDL) which is platform and programming language independent.

Having the basic message as the unit of communication instead of operation, web services enables loose coupling in SOA platforms (Carter, 2007).

Reusability of the services can be best explained using mass customization concept from manufacturing which is using combinations of standard modules to form an individualized product. SOA is used to apply this approach to the business processes of the organization. Basically following this concept, the services introduced by SOA can easily be reused to create new business processes. As services created using existing back-end infrastructure, this approach will provide the ability customize products in a mass scale (Holtschke, 2006).

The fact that nowadays the market and customers are becoming increasingly demanding requires more flexible IT capabilities to respond in time to changing business processes and business rules (Holtschke, 2006).

Opportunity to increase growth and revenue, reduction in time-to-market values and cost reductions are some of the motivations of business agility. SOA fosters the ease of integration in the applications of the enterprise through interoperability and enables the usage of existing applications of the enterprise by wrapping them as services. For this reason SOA is expected to increase the agility of the enterprise in the long-term (Tews, 2007).

Business Value of SOA

To be able to be up-to-date and survive in this highly competitive business world, businesses can not ignore to leverage from diverse technologies in their day-to-day operations and long-term strategy. Organizations are seeking for the opportunities to

broaden their connectivity and increase their revenues; however they do not forget the need to innovation which is possible by restructuring the applications for more flexibility and lower costs (Bieberstein, 2006).

It is clear that SOA has a significant potential business impact to an enterprise; however this is possible only if the proper business modeling and context are considered during the planning and implementation of SOA (Marks and Bell, 2006).

A survey called Global CEO Study, conducted by IBM Business Consulting in 2004, showed that many CEOs believe that their companies are not responsive enough to changing business and market conditions; they also say that their companies are not agile to pursue new market opportunities. For this reason, one of the most important goals of SOA is to provide the baseline for the needs of this agile and rolling enterprise vision. This is achieved by delivering a strong business value proposition (Bieberstein, 2006).

It is also important to decide whether a specific activity is valuable from business perspective. According to Merrifield et al. (2008), if an activity, or the capabilities delivered by the activity, differentiates the company from the competitors, has a great influence to keep the customer loyal or drives a key performance measure (like manufacturing cost, quality or time to market), this activity is considered as an activity providing business value. Moreover, anticipating the changes in the market and developing new customer, partner, and supplier relationships can be considered as additional business drivers for SOA (Bieberstein, 2006).

Business benefits of SOA include not only tangible benefits, but also less tangible but more compelling benefits. It is also important to understand how soft issues are relevant to achieve service oriented architectures. An interesting concept to describe

the importance of soft issues such as cultural differences, behavioral issues and organizational dynamics in SOA success is the “SOA Network Effect” introduced by an article in ComputerWorld (Marks, 2004). Also Marks and Bell (2006) state that these soft issues are the most difficult aspects of achieving SOA and they are also the key to ultimate success or demise of SOA.

Challenges of SOA

The reason enterprises do not start to put in place SOAs considering all the benefits and advantages is because SOA is not so easy to implement, manage and control. There are a lot of difficulties to be faced during SOA adoption. It is not just about technology, but mainly about the soft issues like organizational, cultural and behavioral aspects of SOA which are also important parts of SOA success (Marks and Bell, 2006).

Following are some of the challenges encountered during SOA adoption:

- Resistance to Change
- IT Skills Shortage
- Lack of Business Understanding
- Governance
- Unable to Show ROI (Return on Investment)
- Lack of Business Involvement
- Lack of Leadership Engagement
- Security
- Application Ownership
- Training

According to a survey done within insurance companies, %60 of the companies stated that resistance to change is one of the challenges they faced during SOA adoption (Rabkin, 2009).

Most of the SOA work is the integration of services. This integration can become a very complex task if the enterprise does not have skilled people experienced to work in a SOA environment (Mahmood, 2007).

This means that business people do not know what SOA is. This can be lack of general knowledge or some specific benefits SOA can bring to enterprise (Rabkin, 2009).

A stable and concrete SOA governance model is essential for the success of SOA. This kind of model requires clearly defined and enforceable policies and the governance to be implemented across all the processes of the organization including enterprise architecture, service design, service publishing, service discovery, and run-time activities. SOA Governance is necessary to get the most business value from SOA (Marks and Bell, 2006).

Moreover, Gartner states the fact that SOA projects will be failures unless they are managed and audited properly (Mahmood, 2007).

SOA requires a huge investment in terms of technology and development. This is expected to cost a lot to the enterprise as well and it might take long time for the Return on Investment (ROI) to become visible (Mahmood, 2007).

Moreover, developing technology solutions do not help materialize ROI, on the other hand how the technology is used is the key which will bring value to enterprise. For this reason, it is not recommended to start any SOA initiative if the enterprise does not have any idea on how to use it or how to make it bring benefits (Keller, 2006).

SOA requires involvement of business people from the very beginning of the SOA adoption to define the services to be used within the enterprise and create them as well. If the requirement of business is something quick and very specific, it may not make sense to put a lot of investment and effort to start a long-term SOA project (Keller, 2006).

SOA adoption needs to be led by the top management as it requires too much effort and change. Moreover, they will need to take part in the efforts to enrich the change management practices developed during past years. Top management of the organization should be aware and clear about the impact of SOA adoption on the organization and they should be on board for this journey (Silverstone and Nichols, 2007).

Services are more open to other services and applications than traditional monolithic applications as a result of usage of open standards, which may result in some security issues. For instance, even though WS-Security provided some resolutions, Internet protocols are still not reliable enough and there is a considerable amount of work that still needs to be done (Mahmood, 2007).

SOA makes application ownership unclear, as a result who owns which part of the applications becomes an issue (Mahmood, 2007).

In SOA adoption, it is a good practice to create a centralized group or team that is responsible from the management of architecture to be able to help standardize services and components (Keller, 2006).

SOA is a new way of architecture which requires usage of new technologies. It takes long time to get the knowledge to be able to put in place these technologies and not many experienced people are available on the market. An enterprise which wants to

move to SOA should consider the deep knowledge of these technologies as a critical item in their list (Mahmood, 2007).

CHAPTER 3

ORGANIZATIONAL CHANGES FOR SOA ADOPTION

Corporate Governance Model

All organizations have some kind of IT governance defined within the organization. However, the organizations that are able to design the governance properly have the ability to deliver superior results on their IT investments, and have the opportunity to significantly impact competitive strategy (Weill and Ross, 2004).

On the other hand, having good IT governance is not enough itself. The organization should make sure that business architecture and IT architecture are striving to achieve the same business outcome. Today, most companies do not follow this principal. Governance is the main driver of this synergy.

Figure 1 depicts the current and expected (future) relationship of corporate governance and IT & SOA governance. Current structure is similar to left side of the figure. The organization does not have a complete alignment of governance practices, so the CEO is not able to find out the responsible person when a customer service request arises. On the other hand, the recommended future structure depicted on the right side shows how corporate governance overarches the IT & SOA governance which ensures that everything is driven by business and IT & SOA goals and directions line up under the business goals (Carter, 2007).

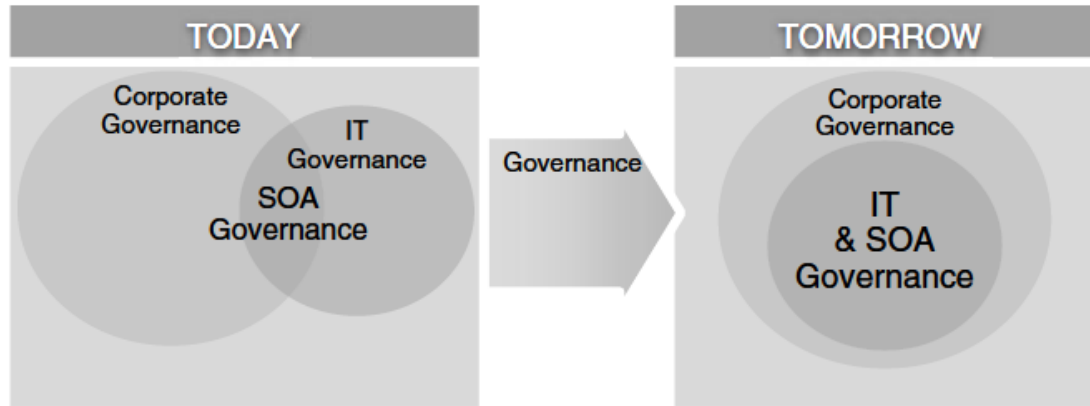


Figure 1: Aligning Corporate, IT and SOA Governance (Carter, 2007)

To be able achieve a successful SOA Adoption with corporate governance overarching SOA governance for business and IT alignment, several changes are recommended by different SOA experts and practitioners:

Organizational Structure

There are several different structures for organizations. Hierarchical structure is the most dominant structure within organizations where one manager can only report to a single manager at the next higher level. Hierarchical structure can take place in two main forms, “divisional” and “functional” structures (Harris and Raviv, 2002). Functional structures are very traditional structures and usually exist in organizations, like militaries, where strong control and command are required (Stanford, 2007). Hierarchies where all activities related to a specific product, group of products or type of customer are grouped under a division are called divisional hierarchies (Harris and Raviv, 2002).

Grouping can be done based on product structure, geographic or market structure, process structure or customer structure (Stanford, 2007).

Most of the remaining organizations use a matrix structure. In matrix structure it is possible for a manager to report two or more senior managers (Harris and Raviv, 2002). The objective of a matrix structure is to allow teams of highly skilled individuals which will result in increase in efficiency and creation of innovative solutions (Stanford, 2007).

As SOA is a concept for distributed systems and distributed processes have become reality recently, all of the above structures do not either support or provide sufficient functionality (Josuttis, 2007). In functional structures, as a result centralized control, multilayered bureaucracies occur resulting in being less responsive to changing business conditions. In geographic divisions, there are problems like duplication, extra costs and inconsistent messages to different markets. Other divisional structures might cause silo effect. And finally in matrix structures it is difficult to balance the activities within different subsets as the organization is very complex (Bieberstein et al., 2006).

Bieberstein et al. (2006) introduces the concept of “Human Services Bus (HSB)” which is an optimized organizational structure created to be able to respond quickly to rapidly changing business environment. The idea behind is to create a new structure using traditional SOA concepts and the organizational structures in place, and try to maximize the benefits and reduce as much as possible the limitations by combining both.

Josuttis (2007) also stresses the fact that today, the dominant structure in many companies is departmental approach and each department has their own systems to implement and maintain. Most of the departments in companies started as projects and

the need to maintain projects resulted in the foundation of the departments. Every department has its own client as well, which makes it very difficult for an average support employee to deal with multiple clients. Following diagram (Figure 2) shows how departments lead to monolithic systems.

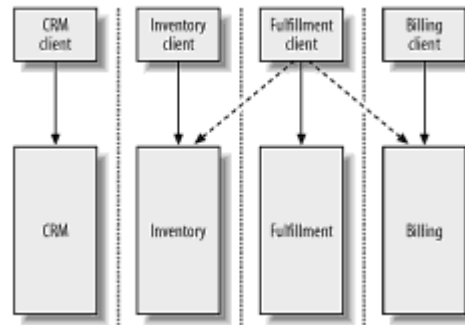


Figure 2: Departments lead to monolithic systems (Josuttis, 2007)

As a result of the increase in the usage distributed processes through SOA, the ownership of a process does not necessarily belong to a single department, thus there is a need to enhance the existing departmental approach to fit into SOA. Two main modifications are the project-oriented organization structure for the development of new distributed processes and introduction of some cross-domain departments to be able to maintain the cross-department functionality (Josuttis, 2007).

Cherbakov et al. (2005) also mentions that there is a need to move from traditional hierarchical enterprises to service-oriented enterprises which are horizontal, similar to a network structure based on service consumer-provider relationship.

Juneja et al. (2007) points out the similarities between manufacturing systems and the organizational structures while explaining the required organizational changes for SOA adoption. Three major manufacturing models are Build-to-order, Made-for-

order and Assemble-to-order. SOA does not fit the first two as every application request can not result in a launch of completely new application like in Build-to-order which is against reusability and agility, and high standardization in Made-for-order has disadvantages in terms of flexibility and extensibility. SOA fits to the third model, Assembly-to-order, in which the business is based on identifying the elements where standardization provides feature and cost advantage and customization provides competitive business advantage. The obvious example of this type of manufacturing is car manufacturing where the manufacturer offers base models (like sedan, SUV) which are configured and assembled based on customer choices (Juneja et al., 2007).

Even though many people agree that SOA requires change in the organizational structure, Merrifield et al. (2008) asserts the fact that most companies that have started SOA adoption have applied it without considering the option of re-designing of their businesses as a first step. Having omitted this option, they have disregarded SOA's greatest value which is the opportunity to re-design the organizational structure to make it much more focused, efficient, and flexible.

IT Investment & Funding Models

As opposed to requirements of SOA which requires sharing capabilities as services and reusing existing assets, in traditional architectures budgets were allocated in silos at the project, group, or department level. For this reason, SOA requires new procedures for funding new services and architecture.

The real benefit of SOA will be realized when organizations stop investing locally to departments and start investing on enterprise-wide assets. If the organization

can not address the financial issues, especially the central funding of reusable services, it might result in duplicated services and infrastructure where each of them will address the needs of individual projects and will not be used across departments (Afshar, 2007).

SOA strategy requires funding as a whole. One of the main problems here is model to be used to fund the SOA and the new services to be created. Even though there are several options, in practice two main approaches used:

- The first consumer or the first application which needs the service pays for the implementation
- A pool of resources created within the organization to fund the new services (Josuttis, 2007)

Similarly, Cherbakov et al. (2005) states that funding of IT activities is expected to change in most effective organizations. The services are the assets of the enterprise, so the funding model needs to be aligned to enterprise level instead of being based on departments or specific business lines. It can be even possible to charge the consumers of the services based on the consumption rate.

While explaining how the SOA transformation performed in IBM, Walker (2007) states that they had to change their funding model as a part of SOA Governance activities.

According to Liegl (2007), any kind of investment in traditional enterprises, regardless of whether handled by a department or specifically IT department, the objective is to have the positive ROI as quick as possible. In case of a SOA, it is possible to identify 3 different types of investment: organizational, architectural and infrastructural. All of these investments need to be handled in enterprise level and have a single financial objective: to lower the cost of processes. Some of the organizational

investments are new processes like service setup, service deployment and also human resources activities. Moreover, it should be kept in mind that SOA does not provide quick ROI and enterprises should be patient to realize the financial benefits (Liegl, 2007).

Smith and McKeen (2008) explain a model which is used in FCC, Farm Credit Canada, which provides financial services for Canadian agricultural businesses. Traditionally, in FCC each business unit had some money to spend on technology, and each used this money for the interests of their units. However in their new model, they created an IT budget which is owned by the enterprise. Also, IT Steering Committee created a scoring system based on several criteria like ROI, risk and cost. Any project request coming from business units were being assessed by the committee and the best scoring projects were funded. FCC believes that this model was a critical success factor in their SOA transformation as the projects that benefit the enterprise most have been given priority (Smith and McKeen, 2008).

People and Roles

Business architect, process analyst, SOA enterprise architect are various job titles those can be found on the job advertisements provided by several organizations to be able to make sure that service oriented projects will be designed and implemented correctly and filled by professionals skilled in both business and technology (Havenstein, 2005).

SOA transformation is more than just being a technology change; it also requires change in the behavior of the employees as well. Some of the changes required include creating a group of employees called process officers for improving business processes,

developing SOA specific skills, encouraging sharable and reusable services and creating a group responsible from SOA governance (Afshar, 2007). As a best practice, Afshar (2007) recommends foundation of an Integration Competence Center (ICC) to be able to facilitate trainings for managers and stakeholders, project managers, business analysts, and quality assurance team as usually SOA adoption starts with a group of architects and developers and explaining SOA philosophy to employees enterprise-wide is essential.

According to Mattsson et al. (2007), there are new roles to be created in the following areas to be able to design, implement and maintain a more effective SOA platform:

- SOA Support Roles
- SOA Strategy and Governance Roles
- SOA Design and Quality Management Roles
- SOA Development and Evolution Roles

Figure 3 shows the proposed roles for each area above.

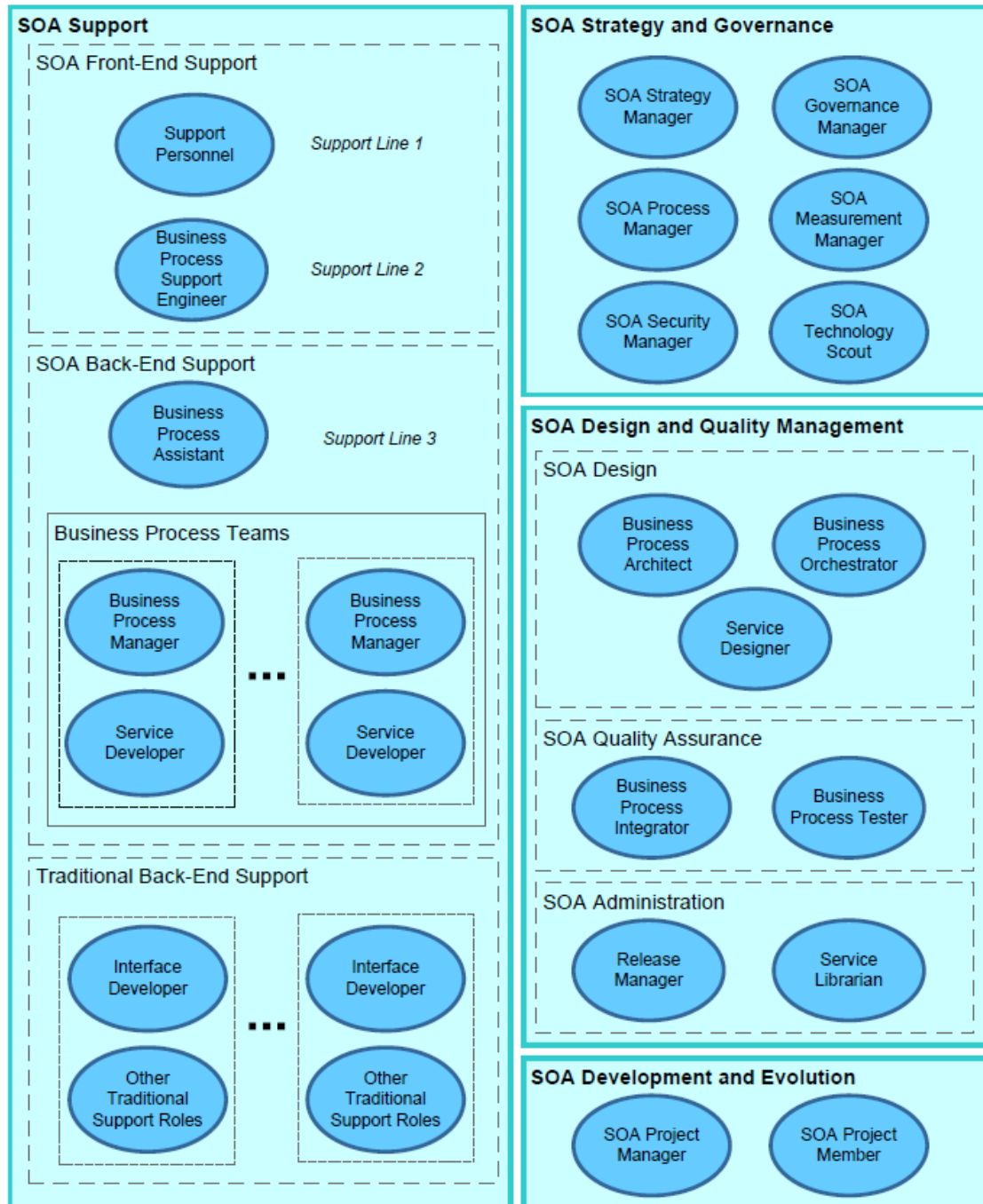


Figure 3: SOA-Based System Development, Evolution and Maintenance Roles

(Mattsson et al., 2007)

Liegl states that emergence of so many new roles in the enterprises as a result of SOA adoption required significant changes in human resources activities. He adds that as opposed to traditional development techniques where applications are sponsored by the business executives and passed to application developers through project managers, in service oriented application development approach, business executives and business analysts define the business architecture, business analysts define and modify processes and user interfaces, and programmers develop the components. Therefore increase in the importance of business analyst role makes hiring of skilled business analysts or the training of existing ones a major task in SOA adoption (Liegl, 2007).

Mathews (2006) provides a few examples of how some companies re-structured their IT and business staff. He states that in Quintiles Transnational, a new position called business relationship manager which is responsible from entire business and have to make sure that business and SOA implementation are aligned was created. They are the point of contact for senior management as well. Another example Mathews (2006) provides is the JM Family Enterprises, an automotive holding company. CIO of the company agreed that there needs to be changes in staff structure and states that they created a new position called client advocate. They were responsible from responsible for analyzing business and technology needs by the help of the subject matter experts they staffed in project management offices, who are responsible from specific business processes.

Cherbakov et al. (2005) point out the similarities between as supply chain and service oriented enterprise. According to them, in traditional manufacturing companies main focus is the supply chain of raw materials and they try to ensure reliable and timely delivery. They have to manage possible delays and problems in the supply chain. For a

service oriented enterprise, services are the raw materials and, changes and negotiations with service providers must be faster than it used to be. As a result, service intermediaries created to be able to shorten the negotiations. Prequalification of the service providers is one of the major roles of service intermediaries. In several other roles intermediaries can behave like liaisons between providers, consumers and even other intermediaries.

Moreover, Woods and Mattern (2006) introduce four new group of technology professional needed for enterprise SOA:

- Disruptive innovators: People in this group are supposed to drive the innovation by introducing new groundbreaking services, applications and business processes. This group is a part of strategy development team of the IT organization.
- Composers: They are responsible for the design of the existing business processes. They usually take the advantage of using model-driven development tools to be able to combine process modules using multiple enterprise services.
- Consolidators: They analyze the existing IT applications, legacy systems and any other investment and decide whether to keep them or replace them based on the impact of the system in the business of the enterprise.
- Repository keepers: They are mainly responsible from the management of the services in the enterprise; they create services and also maintain the repository to support the other three levels.

All these changes required in the organization adopting SOA, will change the way IT works and force IT departments to become application integrators, rather than application developers (Bort, 2005).

Operational Activities

As the services are used by different departments and processes in the enterprise, some operational changes that are captured as policies are required. As a part of SOA governance, policies should cover following:

- A model for operational activities of services
- Capacity monitoring and planning of shared services to ensure that critical business processes are supported
- Definition of security, access, logging and billing policies together with a model to handle policy exceptions

If the operational policies are not applied properly, the overall SOA solution will not be accountable.

Even though benefits of SOA in terms of maintenance and operations are huge, it is not discussed and considered as it deserves. By the help of service management capabilities of SOA, it is much easier to maintain a SOA enabled system than a system with monolithic applications. As the cost of maintenance is between 60 and 80 percent of total cost of an application, even 10 percent reduction will return a lot to the enterprise (Afshar, 2007). As a best practice, Afshar (2007) recommends a centralized support team until the SOA solution becomes mature enough and deployment of a web services management solution for runtime policy enforcement.

According to Merrifield et al. (2008), SOA adoption requires departments to share operations and application code, companies to outsource more than before and business units to move part of operations to customers and suppliers.

Furthermore, Juneja et al. (2007) states the fact that the enterprise needs to make significant changes to be able to handle operations more effectively in a SOA environment. He focuses on four main differences between traditional and SOA operations:

- Traditionally, applications are implemented for the specific vertical business needs. However in SOA, services are designed to meet the needs of diverse consumers, mostly business processes or other services in the system.
- In traditional operations, there are applications that are scaled up on based on the capacity of the custom platform designed. In SOA, there are no capacity limitations; it can be extended based on needs or demand.
- High availability is achieved through redundant infrastructure in traditional applications, in SOA instead, it is possible to assure high availability through service redundancy.
- Traditional Operations needs to specialize in support of many solution stacks, so cross-training and coverage can become issues. SOA Operations is tuned to ensure that service levels of many SOA services are maintained.

Collaboration

Josuttis (2008) asserts the fact that SOA transformation definitely requires collaboration from the very beginning, the initial ideas, to the end, operations and maintenance. He also states the fact that collaboration may not be so easy in organizations in which there are isolated departments each of them acting on its goodness. Changing the culture of

the organization will be the only way in such cases to ensure successful SOA adoption, any model within the enterprise which undermines the value of collaboration can jeopardize success.

Moreover, while explaining the SOA transformation in Unum, U.S. market leader in providing disability and long term care insurance, McGee (2008) states that according to Unum CIO, collaboration was vital and one of the key factors in success as there were more than 400 people from business and technology domain in the project that had to work together in cooperation.

Management Support

There is no doubt that one of the key success factors of SOA transformation is the management support. SOA is a new strategy which will require transformation not only in technology but also in culture and the structure of the organization and CIOs and CEOs have to understand these impacts SOA will have in the enterprise. Moreover, they have to provide enough time to SOA team to be able to put in place the new processes and should not expect to get the benefits of SOA in one year. SOA is a strategy which requires long term commitment and will take several years to be established properly (Josuttis, 2008)

According to McGee (2008), SOA transformation in Unum was successful and one of the main factors behind this was the senior management's commitment to the project including the CEO and the board of directors. She states the fact that the management stood behind the project and celebrated the key milestones together with the project teams throughout the project.

Moreover, Afshar (2007) expresses the importance of executive-level buy-in and states that without management buy-in, it is very difficult to put in place a SOA solution within the enterprise with full potential.

CHAPTER 4

RESEARCH ANALYSIS

Research Design and Methodology

This section provides the details about the objective of the research and the methodology used.

Methodology

The research has been founded on both secondary and primary data. To be able to have basic knowledge of the subject and to go into details, several resources such as books, journals, articles and conference proceedings have been used. As SOA is a recent architectural approach, basically secondary data backs to last 5-10 years.

To be able to collect primary data a survey has been designated based on the information gathered during the literature review. The intended audience of the survey is the professionals who have hands on experience in at least one SOA project.

Figure 4 below depicts the research model of the study.

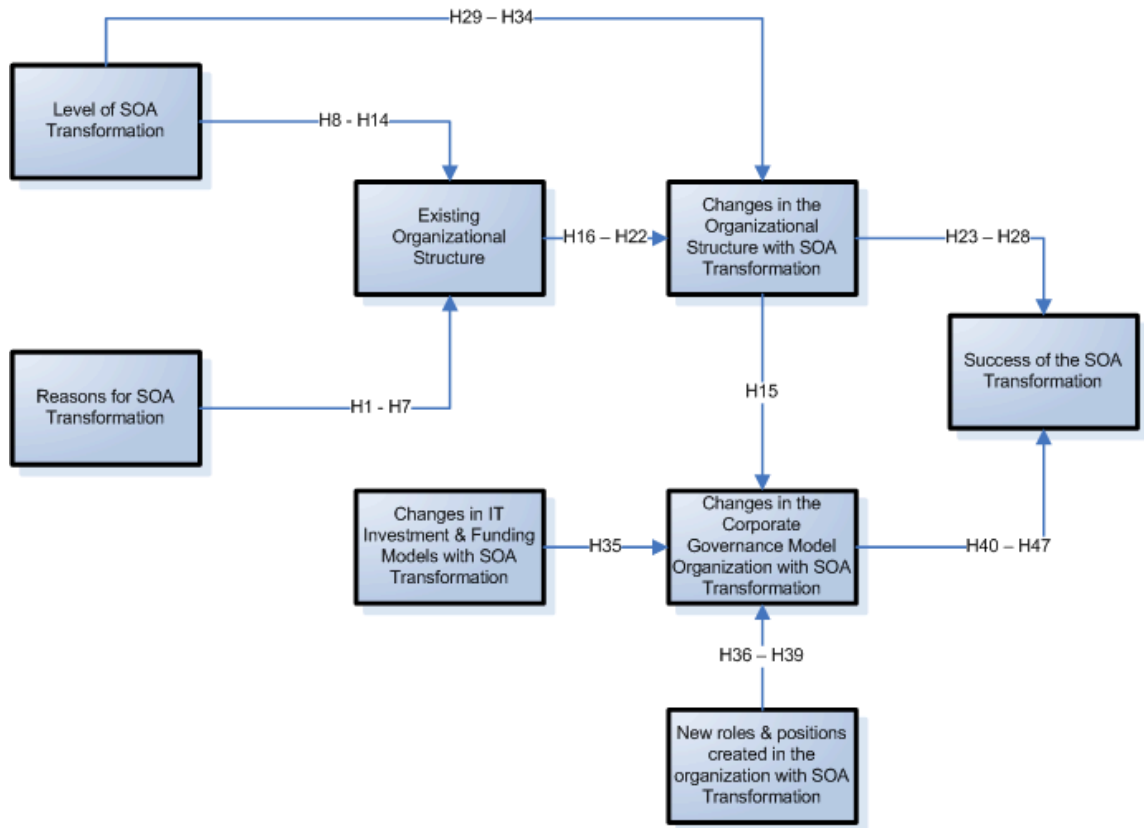


Figure 4: Research Model

Sampling

As it is not possible to find every single SOA professional, a sample, subset of the population which has to represent the population properly, was needed.

Prior to identification of the sample, an informal investigation has been made to understand how widespread SOA transformation is in Turkey. What is found is that SOA is not yet common in Turkey and mostly applied in Telecommunications and Banking sectors. For this reason, the sample has been created with professionals from Turkey and several European countries including Denmark, Greece, Italy, Poland, Romania and Slovak Republic.

In total, the survey has been offered to 50 professionals; 10 of them have been conducted face to face and 40 of them have been sent as e-mails. 24 of the e-mail surveys have been returned. As a result, in total 34 of the 50 professionals has been responded to the survey.

The sample has to be kept small as there are not yet many SOA transformations ongoing even though many CIO's all over the world are considering introducing this new architecture in their organizations.

Survey

The survey consists of 11 questions (see Appendix A). There is only one open-ended question (question 10), all the questions are close-ended questions which are prepared as based on multiple choice, multiple answers or likert scale. The survey has 4 main dimensions as shown in the table below:

Table 1: Survey Dimensions and Details of Questions

| Dimension | Question(s) | Details |
|-----------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Demographics | 1 | 1. Only questions like title, sector, location and SOA experience in years are asked to gather basic information about the interviewee. To be able to keep the interviewee anonymous, name or the organization is not included in the list of questions. |
| Level, reasons and overall success of the SOA transformation | 2, 4 and 5 | 2. This question is to find out the level of SOA transformation scaling from enterprise-wide to single isolated projects. 4. Interviewee is requested to specify the reason(s) for the SOA Transformation. There are 7 reasons and the option to specify a custom one. It is possible to select multiple reasons. 5. This question is to find out the success of SOA transformation scaling from far more than successful to far less than expected. It is possible to select “Not deployed to production environments” if the SOA transformation is still in development. |
| Organizational changes required for SOA transformation | 7, 8 and 9 | 7. Interviewee is requested to specify the structural change(s) in the organization introduced during the SOA transformation. There are 6 possible changes and the option to specify a custom one. It is possible to select multiple changes. 8. Interviewee is requested to specify the new funding model(s) introduced during the SOA transformation. There are 4 possible funding models and the option to specify a custom one. It is possible to select multiple funding models. 9. Interviewee is requested to specify the new role(s) from different areas in the organization introduced during the SOA transformation. There are 19 possible roles in 4 different areas and the option to specify a custom role. It is possible to select multiple roles. |
| Impacts of several changes in the success of the Transformation | 11 | 11. The impact of 4 possible changes on the success of SOA transformation is examined. Interviewee is expected to specify the impact of each item by the help of a likert scale where 1 corresponds to very low impact and 5 to very high impact. 4 possible changes are collaboration, management buy-in, IT staffing and organizational structure. |

Table 2: Survey Questions and References

| # | Question | References |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 1. | Demographics | |
| 2. | What is/was the extent of SOA in your organization? | |
| 3. | At what stage your SOA is? | (Smith, 2009) |
| 4. | Based on your experience, what are the reasons for SOA transformation? (Please select all applicable changes from the list below) | (Rabkin, 2009) |
| 4.a | Supporting ever-changing business environment to become more agile | (Rabkin, 2009) |
| 4.b | Enhancing internal operational process efficiency and flexibility | (Rabkin, 2009) |
| 4.c | Improving quality of IT systems | (Rabkin, 2009) |
| 4.d | Increasing revenue | (Rabkin, 2009) |
| 4.e. | Better integration of processes/information with customers/suppliers | (Carter, 2007) |
| 4.f | Fostering software (service) reuse | (Holtschke, 2006) |
| 4.g | Lowering IT Operating Costs | (Bieberstein, 2006) |
| 5. | How successful have your SOA projects been? | (Smith, 2009) |
| 6. | What kind of organizational structure have your organization had when you started SOA Transformation? | (Harris and Raviv, 2002), (Stanford, 2007) |
| 7. | Did you apply any changes to structure of the organization during or after the SOA Transformation? If yes, please select all applicable changes from the list below. | |
| 7.a | Creation of project-oriented organization structure for the development of new distributed processes | (Josuttis, 2007) |
| 7.b | Introduction of some cross-domain departments to be able to maintain the cross-department functionality | (Josuttis, 2007) |
| 7.c | Foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities | (Afshar, 2007) |
| 7.d | Moving from hierarchical organizational structures to more horizontal structures | (Cherbakov et al., 2005) |
| 7.e | Improving the relationship between business units and IT | (Carter, 2007) |
| 7.f | Creation of a new operating process in IT organization for service management | (Afshar, 2007) |

Table 2: Continued.

| # | Question | References |
|------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 8. | Were there any changes made in the investment and/or funding model? If yes, please select all applicable changes from the list below. | |
| 8.a | Central funding - A pool of resources created within the organization to fund the new services | (Josuttis, 2008) |
| 8.b | The first consumer or the first application which needs the service pays for the implementation | (Josuttis, 2008) |
| 8.c | All consumers of the service should pay for the development | (Josuttis, 2008) |
| 8.d | Provider handles the development costs and charges the consumers of the services based on the consumption rate | (Josuttis, 2008) |
| 9. | Based on your experience, what kind of new roles needs to be created within the organization for SOA Transformation? (Select all that applies) | (Mattsson et al., 2007) |
| 10. | Do you think organizations needs to make changes to operational activities? If yes, please specify. | (Afshar, 2007) |
| 11. | To what extent following changes impacted the success of the SOA Transformation? (1 – Very Low Impact, 5 – Very High Impact) | |
| 11.a | Collaboration | (Josuttis, 2008) |
| 11.b | Management buy-in | (Josuttis, 2008), (Afshar, 2007) |
| 11.c | IT Staffing | (Afshar, 2007) |
| 11.d | Organizational structure | (Juneja et al.,2007) |

Research Hypotheses

- 1) H1: There is a relationship between the reason for SOA transformation “Supporting ever-changing business environment to become more agile” and the existing organizational structure.
- 2) H1: There is a relationship between the reason for SOA transformation “Enhancing internal operational process efficiency and flexibility” and the existing organizational structure.
- 3) H1: There is a relationship between the reason for SOA transformation “Improving quality of IT systems” and the existing organizational structure.
- 4) H1: There is a relationship between the reason for SOA transformation “Increasing revenue” and the existing organizational structure.
- 5) H1: There is a relationship between the reason for SOA transformation “Better integration of processes/information with customers/suppliers” and the existing organizational structure.
- 6) H1: There is a relationship between the reason for SOA transformation “Fostering software (service) reuse” and the existing organizational structure.
- 7) H1: There is a relationship between the reason for SOA transformation “Lowering IT Operating Costs” and the existing organizational structure.
- 8) H1: There is a relationship between the reason for SOA transformation “Supporting ever-changing business environment to become more agile” and extent of the SOA transformation.

- 9) H1: There is a relationship between the reason for SOA transformation “Enhancing internal operational process efficiency and flexibility” and the extent of the SOA transformation.
- 10) H1: There is a relationship between the reason for SOA transformation “Improving quality of IT systems” and extent of the SOA transformation.
- 11) H1: There is a relationship between the reason for SOA transformation “Increasing revenue” and extent of the SOA transformation.
- 12) H1: There is a relationship between the reason for SOA transformation “Better integration of processes/information with customers/suppliers” and extent of the SOA transformation.
- 13) H1: There is a relationship between the reason for SOA transformation “Fostering software (service) reuse” and extent of the SOA transformation.
- 14) H1: There is a relationship between the reason for SOA transformation “Lowering IT Operating Costs” and the extent of the SOA transformation.
- 15) H1: SOA requires changes in the organizational structure.
- 16) H1: Organizational changes depend on the current structure of the organization.
- 17) H1: There is a relationship between the organizational change “creation of a project-oriented organization structure for the development of new distributed processes” and the existing organizational structure.
- 18) H1: There is a relationship between the organizational change “introduction of some cross-domain departments to be able to maintain the cross-department functionality” and the existing organizational structure.

- 19) H1: There is a relationship between the organizational change “foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities” and the existing organizational structure.
- 20) H1: There is a relationship between the organizational change “moving from hierarchical organizational structures to more horizontal structures” and the existing organizational structure.
- 21) H1: There is a relationship between the organizational change “improving the relationship between business units and IT” and the existing organizational structure.
- 22) H1: There is a relationship between the organizational change “creation of a new operating process in IT organization for service management” and the existing organizational structure.
- 23) H1: There is a relationship between the organizational change “creation of a project-oriented organization structure for the development of new distributed processes” and success of the SOA transformation.
- 24) H1: There is a relationship between the organizational change “introduction of some cross-domain departments to be able to maintain the cross-department functionality” and success of the SOA transformation.
- 25) H1: There is a relationship between the organizational change “foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities” and success of the SOA transformation.
- 26) H1: There is a relationship between the organizational change “moving from hierarchical organizational structures to more horizontal structures” and success of the SOA transformation.

- 27) H1: There is a relationship between the organizational change “improving the relationship between business units and IT” and success of the SOA transformation.
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- 33) H1: There is a relationship between the organizational change “improving the relationship between business units and IT” and extent of the SOA transformation.
- 34) H1: There is a relationship between the organizational change “creation of a new operating process in IT organization for service management” and extent of the SOA transformation.

- 35) H1: SOA requires changes in the funding model.
- 36) H1: SOA requires new "Support Roles" in the organization.
- 37) H1: SOA requires new "Strategy and Governance Roles" in the organization.
- 38) H1: SOA requires new "Design and Quality Management Roles" in the organization.
- 39) H1: SOA requires new "Development and Evolution Roles" in the organization.
- 40) H1: There is a difference between different levels of SOA transformation in the organization and the organization's perception of the impact of collaboration in SOA success.
- 41) H1: There is a difference between different levels of SOA transformation in the organization and the organization's perception of the impact of management buy-in in SOA success.
- 42) H1: There is a difference between different levels of SOA transformation in the organization and the organization's perception of the impact of IT staffing in SOA success.
- 43) H1: There is a difference between different levels of SOA transformation in the organization and the organization's perception of the impact of organizational structure in SOA success.
- 44) H1: There is a difference between different initial structure of the organization and the organization's perception of the impact of collaboration in SOA success.

- 45) H1: There is a difference between different initial structure of the organization and the organization's perception of the impact of management buy-in in SOA success.
- 46) H1: There is a difference between different initial structure of the organization and the organization's perception of the impact of IT staffing in SOA success.
- 47) H1: There is a difference between different initial structure of the organization and the organization's perception of the impact of organizational structure in SOA success.

Research Findings

This section provides the details of the research results and analysis of the hypotheses. Initially, a reliability analysis of the survey is performed and descriptive statistics regarding every single question are shown. Then, tests for all the hypotheses are performed and obtained results are presented. Finally, correlations between several items are calculated and presented.

Reliability Analysis

Reliability analysis is performed to be able to measure the internal consistency of the survey. This analysis will be performed for each dimension of the survey. In this research, Cronbach's alpha is the model to be used for reliability analysis. The range for Cronbach's alpha to ensure the internal consistency reliability of a dimension is between

0.6 and 0.8. In case a dimension will not fall into this range, factor analysis is needed to extract the right dimension(s).

Dimension 1

Reliability analysis is not necessary for demographics as these data will not be used in further analysis.

Dimension 2

Table 3: Reliability Statistics for Dimension 2 – Iteration 1

| Reliability Statistics | | |
|------------------------|----------------------------------------------|------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .287 | .284 | 9 |

Cronbach's alpha is 0.284 which means the dimension is not reliable enough. For this reason factor analysis is performed as follows:

Table 4: Factor Analysis for Dimension 2 – Component Matrix

| Component Matrix ^a | | | | |
|----------------------------------------------------------------------|-----------|-------|-------|-------|
| | Component | | | |
| | 1 | 2 | 3 | 4 |
| What is/was the extent of SOA in your organization | .769 | .137 | .060 | -.050 |
| Supporting ever-changing business environment to become more agile | .687 | -.403 | -.054 | .371 |
| Enhancing internal operational process efficiency and flexibility | .524 | .494 | .125 | .093 |
| Improving quality of IT systems | -.456 | .035 | .420 | .552 |
| Increasing revenue | -.210 | -.317 | .588 | .322 |
| Better integration of processes/information with customers/suppliers | -.306 | -.178 | .577 | -.644 |
| Fostering software (service) reuse | .704 | .384 | .398 | -.113 |
| Lowering IT Operating Costs | -.290 | .842 | .191 | .122 |
| How successful have your SOA projects been | .566 | -.386 | .340 | -.050 |
| Extraction Method: Principal Component Analysis. | | | | |
| a. 4 components extracted. | | | | |

According to the component matrix above which is generated using Principal Component Analysis as extraction method, there are 4 components. In factor analysis, factors over 0.6 are considered as high. First component extracted has 5 variables which has values close or above 0.6 and it is selected as one of the new dimensions extracted from the initial dimension. The other 3 components are not considered as dimensions as

they do not have more than 2 variables with factor loading over 0.6 and there are also cross-loadings.

Result of the new reliability measure performed based on the first component extracted is as follows:

Table 5: Reliability Statistics for Dimension 2 – Iteration 2

| Reliability Statistics | | |
|------------------------|----------------------------------------------|------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .646 | .708 | 5 |

Having Cronbach's alpha 0.708, we can conclude that the reliability of the new dimension extracted is within the expected range. For this reason this new dimension will be used for the rest of the analysis as dimension 2.

Dimension 3

Table 6: Reliability Statistics for Dimension 3

| Reliability Statistics | | |
|------------------------|----------------------------------------------|------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .717 | .717 | 29 |

Having Cronbach's alpha 0.717, we can conclude that the reliability of the dimension 3 is within the expected range.

Dimension 4

Table 7: Reliability Statistics for Dimension 4

| Reliability Statistics | | |
|------------------------|----------------------------------------------|------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .634 | .635 | 4 |

Having Cronbach's alpha 0.635, we can conclude that the reliability of the dimension 4 is within the expected range.

Descriptive Statistics

In this section, an analysis of the responses to each question is made. If a question allows multiple options to be selected, then an analysis is made for each single option.

Question 1 – Demographics

Table 8: SOA Experience of the Interviewee in Years

| Q1_SOAExperience | | | | | |
|------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | 1 | 6 | 17.6 | 17.6 | 17.6 |
| | 2 | 11 | 32.4 | 32.4 | 50.0 |
| | 3 | 7 | 20.6 | 20.6 | 70.6 |
| | 4 | 9 | 26.5 | 26.5 | 97.1 |
| | 5 | 1 | 2.9 | 2.9 | 100.0 |
| | Total | | 34 | 100.0 | 100.0 |

As SOA is a new design approach, it is almost impossible to find people who have more than 5 years of hands-on experience. For this reason, it can be concluded that the experience of the sample is relevant.

Table 9: Sector of the Interviewee

| Sector | | | | | |
|--------|-----------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Finance | 7 | 20.6 | 20.6 | 20.6 |
| | Insurance | 1 | 2.9 | 2.9 | 23.5 |
| | IT | 2 | 5.9 | 5.9 | 29.4 |
| | Telecom | 24 | 70.6 | 70.6 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Question 2 - What is/was the extent of SOA in your organization?

Table 10: Extent of SOA in the Organization

| What is/was the extent of SOA in your organization | | | | | |
|----------------------------------------------------|-------------------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Enterprise level | 23 | 67.6 | 67.6 | 67.6 |
| | Departmental/divisional level | 11 | 32.4 | 32.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Most of the organizations interviewed (67.6%) started their SOA journey in enterprise level and the remaining (32.4%) decided to keep it departmental/divisional level. None of the interviewees stated that their SOA are just single, isolated projects.

Question 3 - At what stage your SOA is?

Table 11: Stage of SOA in the Organization

| At what stage your SOA is: | | | | | |
|----------------------------|----------------------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | In development | 6 | 17.6 | 17.6 | 17.6 |
| | Deployed in a single department | 6 | 17.6 | 17.6 | 35.3 |
| | Deployed in multiple departments | 17 | 50.0 | 50.0 | 85.3 |
| | Deployed for external use | 5 | 14.7 | 14.7 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

All of the interviewees stated that they already started implementing or deployed to production environments. None of the responses include the “currently evaluating” option.

Question 4 - What are the reasons for SOA transformation?

Table 12: Supporting Ever-changing Business Environment to Become More Agile

| Supporting ever-changing business environment to become more agile | | | | | |
|--------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 29 | 85.3 | 85.3 | 85.3 |
| | No | 5 | 14.7 | 14.7 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 13: Enhancing Internal Operational Process Efficiency and Flexibility

| Enhancing internal operational process efficiency and flexibility | | | | | |
|-------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 27 | 79.4 | 79.4 | 79.4 |
| | No | 7 | 20.6 | 20.6 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 14: Improving Quality of IT Systems

| Improving quality of IT systems | | | | | |
|---------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 9 | 26.5 | 26.5 | 26.5 |
| | No | 25 | 73.5 | 73.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 15: Increasing Revenue

| Increasing revenue | | | | | |
|--------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 7 | 20.6 | 20.6 | 20.6 |
| | No | 27 | 79.4 | 79.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 16: Better Integration of Processes/Information with Customers/Suppliers

| Better integration of processes/information with customers/suppliers | | | | | |
|----------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 24 | 70.6 | 70.6 | 70.6 |
| | No | 10 | 29.4 | 29.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 17: Fostering Software (Service) Reuse

| Fostering software (service) reuse | | | | | |
|------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 23 | 67.6 | 67.6 | 67.6 |
| | No | 11 | 32.4 | 32.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 18: Lowering IT Operating Costs

| Lowering IT Operating Costs | | | | | |
|-----------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 16 | 47.1 | 47.1 | 47.1 |
| | No | 18 | 52.9 | 52.9 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 19: Other Reasons

| Other (please specify) | | | | | |
|------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 3 | 8.8 | 8.8 | 8.8 |
| | No | 31 | 91.2 | 91.2 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

There are 6 changes and the possibility to provide any kind of free text change proposed.

Most of the organizations preferred to move SOA to support ever-changing business environment to become more agile (85.3%) and to enhance internal operational process efficiency and flexibility (79.4%). They also wanted to better integrate processes/information with customers/suppliers (70.6%) and to foster software reuse (67.6%). Part of the organizations considered SOA option to lower IT operating costs (47.1%). Very few organizations started their SOA journey to improve the quality of IT systems (26.5%) or to increase revenue (20.6%). Apart from the provided options,

organizations started SOA transformation as it may look quite appealing and fashionable, it helps isolating legacy systems and increasing time to market value for value added services.

Question 5 - How successful have your SOA projects been?

Table 20: How Successful the SOA Transformation is?

| How successful have your SOA projects been | | | | | |
|--------------------------------------------|---------------------------------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | More successful than expected | 5 | 14.7 | 14.7 | 14.7 |
| | As expected | 22 | 64.7 | 64.7 | 79.4 |
| | Less successful than expected | 5 | 14.7 | 14.7 | 94.1 |
| | Not yet deployed to production environments | 2 | 5.9 | 5.9 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Most of the interviewees (64.7%) stated that their SOA projects are as successful as they expected at the beginning. Some of them mentioned that they have either more successful (14.7%) or less successful (14.7%) than they expected. Few of the projects (5.9%) are not yet in production platforms. None of the projects are far more or far less successful compared to initial expectations.

Question 6 - What kind of organizational structure have your organization had when you started SOA Transformation?

Table 21: Organizational Structure Prior to SOA Transformation

| What kind of organizational structure have your organization had when you started SOA Transformation | | | | | |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Functional Organization | 12 | 35.3 | 35.3 | 35.3 |
| | Divisional Organization (based on products or product lines) | 13 | 38.2 | 38.2 | 73.5 |
| | Matrix Organization | 9 | 26.5 | 26.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

The structure of the organizations before they started to implement SOA is well distributed. 35.3% has functional, 38.2% has divisional and 26.5% has matrix organization.

Question 7 - Did you apply any changes to structure of the organization during or after the SOA Transformation?

Table 22: Creation of Project-oriented Organization Structure for the Development of New Distributed Processes

| Creation of project-oriented organization structure for the development of new distributed processes | | | | | |
|------------------------------------------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 13 | 38.2 | 38.2 | 38.2 |
| | No | 21 | 61.8 | 61.8 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 23: Introduction of Some Cross-domain Departments to be able to Maintain the Cross-department Functionality

| Introduction of some cross-domain departments to be able to maintain the cross-department functionality | | | | | |
|---------------------------------------------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 9 | 26.5 | 26.5 | 26.5 |
| | No | 25 | 73.5 | 73.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 24: Foundation of SOA Center of Excellence, Integration Competence Center or Similar to Centralize SOA Activities

| Foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities | | | | | |
|---------------------------------------------------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 10 | 29.4 | 29.4 | 29.4 |
| | No | 24 | 70.6 | 70.6 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 25: Moving From Hierarchical Organizational Structures to More Horizontal Structures

| Moving from hierarchical organizational structures to more horizontal structures | | | | | |
|----------------------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 5 | 14.7 | 14.7 | 14.7 |
| | No | 29 | 85.3 | 85.3 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 26: Improving the Relationship between Business Units and IT

| Improving the relationship between business units and IT | | | | | |
|----------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 22 | 64.7 | 64.7 | 64.7 |
| | No | 12 | 35.3 | 35.3 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 27: Creation of a New Operating Process in IT Organization for Service Management

| Creation of a new operating process in IT organization for service management | | | | | |
|-------------------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 13 | 38.2 | 38.2 | 38.2 |
| | No | 21 | 61.8 | 61.8 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

The most common change done by the organizations is to improve the relationship between business and IT (64.7%). Creation of a new operating process in IT organization for service management and creation of project-oriented organization structure for the development of new distributed processes are the changes performed by almost half of the interviewed organizations (38.2%). Several companies decided to found SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities (29.4%) and introduce some cross-domain departments to be able to maintain the cross-department functionality (26.5). Few companies moved from hierarchical organizational structures to more horizontal structures during their SOA transformation (14.7%).

Question 8 - Were there any changes made in the investment and/or funding model?

Table 28: Central funding - A Pool of Resources Created within the Organization to Fund the New Services

| Central funding - A pool of resources created to fund the new services | | | | | |
|------------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 19 | 55.9 | 55.9 | 55.9 |
| | No | 15 | 44.1 | 44.1 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 29: The First Consumer or the First Application which Needs the Service Pays for the Implementation

| The first consumer or the first application which needs the service pays for the implementation | | | | | |
|-------------------------------------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 9 | 26.5 | 26.5 | 26.5 |
| | No | 25 | 73.5 | 73.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 30: All Consumers of the Service Should Pay for the Development

| All consumers of the service should pay for the development | | | | | |
|-------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 2 | 5.9 | 5.9 | 5.9 |
| | No | 32 | 94.1 | 94.1 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 31: Provider Handles the Development Costs and Charges the Consumers of the Services Based on the Consumption Rate

| Provider handles the development costs and charges the consumers of the services based on the consumption rate | | | | | |
|----------------------------------------------------------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 4 | 11.8 | 11.8 | 11.8 |
| | No | 30 | 88.2 | 88.2 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Central funding where a pool of resources created within the organization to fund the new services is the most preferred funding option of the organizations which started SOA adoption (55.9%). Only quarter of the organizations interviewed considered the option which requires the first consumer or the first application which needs the service to pay for the implementation (26.5%). The remaining 2 options are selected by few

organizations. 11.8% of them ask the provider to handle the costs and charge the consumers and only 5.9% requires all consumers of the service to pay for the development.

Question 9 - What kind of new roles needs to be created within the organization for SOA Transformation?

Table 32: Business Process Support Assistant

| Business Process Support Assistant | | | | | |
|------------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 7 | 20.6 | 20.6 | 20.6 |
| | No | 27 | 79.4 | 79.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 33: Business Process Assistant

| Business Process Assistant | | | | | |
|----------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 9 | 26.5 | 26.5 | 26.5 |
| | No | 25 | 73.5 | 73.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 34: Business Process Manager

| Business Process Manager | | | | | |
|--------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 23 | 67.6 | 67.6 | 67.6 |
| | No | 11 | 32.4 | 32.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 35: Service Developer

| Service Developer | | | | | |
|-------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 26 | 76.5 | 76.5 | 76.5 |
| | No | 8 | 23.5 | 23.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 36: SOA Strategy Manager

| SOA Strategy Manager | | | | | |
|----------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 24 | 70.6 | 70.6 | 70.6 |
| | No | 10 | 29.4 | 29.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 37: SOA Governance Manager

| SOA Governance Manager | | | | | |
|------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 16 | 47.1 | 47.1 | 47.1 |
| | No | 18 | 52.9 | 52.9 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 38: SOA Process Manager

| SOA Process Manager | | | | | |
|---------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 15 | 44.1 | 44.1 | 44.1 |
| | No | 19 | 55.9 | 55.9 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 39: SOA Measurement Manager

| SOA Measurement Manager | | | | | |
|-------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 2 | 5.9 | 5.9 | 5.9 |
| | No | 32 | 94.1 | 94.1 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 40: SOA Security Manager

| SOA Security Manager | | | | | |
|----------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 7 | 20.6 | 20.6 | 20.6 |
| | No | 27 | 79.4 | 79.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 41: SOA Technology Scout

| SOA Technology Scout | | | | | |
|----------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 8 | 23.5 | 23.5 | 23.5 |
| | No | 26 | 76.5 | 76.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 42: Business Process Architect

| Business Process Architect | | | | | |
|----------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 28 | 82.4 | 82.4 | 82.4 |
| | No | 6 | 17.6 | 17.6 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 43: Business Process Orchestrator

| Business Process Orchestrator | | | | | |
|-------------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 8 | 23.5 | 23.5 | 23.5 |
| | No | 26 | 76.5 | 76.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 44: Service Designer

| Service Designer | | | | | |
|------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 23 | 67.6 | 67.6 | 67.6 |
| | No | 11 | 32.4 | 32.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 45: Business Process Integrator

| Business Process Integrator | | | | | |
|-----------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 22 | 64.7 | 64.7 | 64.7 |
| | No | 12 | 35.3 | 35.3 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 46: Business Process Tester

| Business Process Tester | | | | | |
|-------------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 20 | 58.8 | 58.8 | 58.8 |
| | No | 14 | 41.2 | 41.2 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 47: Release Manager

| Release Manager | | | | | |
|-----------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 11 | 32.4 | 32.4 | 32.4 |
| | No | 23 | 67.6 | 67.6 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 48: Service Librarian

| Service Librarian | | | | | |
|-------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 7 | 20.6 | 20.6 | 20.6 |
| | No | 27 | 79.4 | 79.4 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 49: SOA Project Manager

| SOA Project Manager | | | | | |
|---------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 28 | 82.4 | 82.4 | 82.4 |
| | No | 6 | 17.6 | 17.6 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 50: SOA Project Member

| SOA Project Member | | | | | |
|--------------------|-------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 25 | 73.5 | 73.5 | 73.5 |
| | No | 9 | 26.5 | 26.5 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Some of the new roles provided are considered as critical by organizations, on the other hand some of them did not get much attention. Business Process Architect (82.4%), SOA Project Manager (82.4%), Service Developer (76.5%) and SOA Project Member (73.5%) are roles which are highly in demand. However, roles like SOA Measurement Manager (5.9%), SOA Security Manager (20.6%) and Service Librarian (20.6%) are not so popular within the organizations at the moment.

Question 10 - Do you think organizations needs to make changes to operational activities?

Several organizations stated the fact that there have been some changes in the operational activities in order to accommodate the new integration and process management model. There was a need to introduce significant changes in the formation of the IT and business process management teams. A more horizontal vision is needed for both to be able to support end to end business processes. Also, improvements are necessary to testing and deployment procedures and there is a need to reorganize SLA definitions and related monitoring/assurance.

Question 11 - To what extent following changes impacted the success of the SOA Transformation?

Table 51: Impact of Collaboration in the Success of the SOA Transformation

| Collaboration | | | | | |
|---------------|------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Low Impact | 2 | 5.9 | 5.9 | 5.9 |
| | Medium Impact | 7 | 20.6 | 20.6 | 26.5 |
| | High Impact | 13 | 38.2 | 38.2 | 64.7 |
| | Very High Impact | 12 | 35.3 | 35.3 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 52: Impact of Management Buy-in in the Success of the SOA Transformation

| Management buy-in | | | | | |
|-------------------|------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Low Impact | 4 | 11.8 | 11.8 | 11.8 |
| | Medium Impact | 12 | 35.3 | 35.3 | 47.1 |
| | High Impact | 12 | 35.3 | 35.3 | 82.4 |
| | Very High Impact | 6 | 17.6 | 17.6 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 53: Impact of IT Staffing in the Success of the SOA Transformation

| IT Staffing | | | | | |
|-------------|------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Very Low Impact | 1 | 2.9 | 2.9 | 2.9 |
| | Low Impact | 5 | 14.7 | 14.7 | 17.6 |
| | Medium Impact | 13 | 38.2 | 38.2 | 55.9 |
| | High Impact | 13 | 38.2 | 38.2 | 94.1 |
| | Very High Impact | 2 | 5.9 | 5.9 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

Table 54: Impact of Organizational Structure in the Success of the SOA Transformation

| Organizational Structure | | | | | |
|--------------------------|------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Low Impact | 8 | 23.5 | 23.5 | 23.5 |
| | Medium Impact | 13 | 38.2 | 38.2 | 61.8 |
| | High Impact | 11 | 32.4 | 32.4 | 94.1 |
| | Very High Impact | 2 | 5.9 | 5.9 | 100.0 |
| | Total | 34 | 100.0 | 100.0 | |

73.5% of the respondents stated the fact that collaboration has high or very high impact in the success of their SOA transformation. For the rest of the provided change options are considered to have high or very high impact by around half of the respondents, the details are as follows: management buy-in 52.9%, IT staffing 44.1% and organizational structure 38.3%.

Analysis of Hypotheses

In this section the analysis of the defined hypotheses is done. The techniques used for the analysis are non-parametric tests like chi-square, fisher's exact test, cross tabulation and kruskal wallis test as the data are based on ranks, scores and intervals and calculation of means and/or standard deviation can be misleading. During the tests %5 is used as significance level and all results are generated based on this assumption.

H0: There is no relationship between the reason for SOA transformation “Supporting ever-changing business environment to become more agile” and the existing organizational structure.

H1: There is a relationship between the reason for SOA transformation “Supporting ever-changing business environment to become more agile” and the existing organizational structure.

Table 55: Chi-square Test Results: Supporting Ever-changing Business Environment to Become More Agile versus Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 2.315 ^a | 2 | .314 | .398 | | |
| Likelihood Ratio | 3.536 | 2 | .171 | .351 | | |
| Fisher's Exact Test | 2.137 | | | .398 | | |
| Linear-by-Linear Association | 1.585 ^b | 1 | .208 | .258 | .155 | .068 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50%) have expected count less than 5. The minimum expected count is 1.32. | | | | | | |
| b. The standardized statistic is -1.259. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables. As 3 cells have expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.398) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 can not be rejected which means the reason to support ever-changing business environment to become more agile for SOA adoption does not depend on the existing organizational structure.

H0: There is no relationship between the reason for SOA transformation “Enhancing internal operational process efficiency and flexibility” and the existing organizational structure.

H1: There is a relationship between the reason for SOA transformation “Enhancing internal operational process efficiency and flexibility” and the existing organizational structure.

Table 56: Chi-square Test Results: Enhancing Internal Operational Process Efficiency and Flexibility versus Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .687 ^a | 2 | .709 | .759 | | |
| Likelihood Ratio | .754 | 2 | .686 | .759 | | |
| Fisher's Exact Test | .728 | | | .759 | | |
| Linear-by-Linear Assoc. | .655 ^b | 1 | .418 | .484 | .278 | .106 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50%) have expected count less than 5. The minimum expected count is 1.85. | | | | | | |
| b. The standardized statistic is -.810. | | | | | | |

Cross tabulation is used as the analysis technique. As 3 cells have expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.759) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05.

Therefore, H0 can not be rejected which means the reason to enhance internal operational process efficiency and flexibility for SOA adoption does not depend on the existing organizational structure.

H0: There is no relationship between the reason for SOA transformation “Improving quality of IT systems” and the existing organizational structure.

H1: There is a relationship between the reason for SOA transformation “Improving quality of IT systems” and the existing organizational structure.

Table 57: Chi-square Test Results: Improving Quality of IT Systems versus Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 5.841 ^a | 2 | .054 | .063 | | |
| Likelihood Ratio | 7.858 | 2 | .020 | .039 | | |
| Fisher's Exact Test | 5.745 | | | .046 | | |
| Linear-by-Linear Association | 2.805 ^b | 1 | .094 | .109 | .051 | .020 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 2.38. | | | | | | |
| b. The standardized statistic is 1.675. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables.

As 3 cells have expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.046), which is less than 0.05, it can be concluded that there is a statistically significant difference and the H0 hypothesis can be rejected. As a result, selection of “Improving quality of IT systems” as a reason start SOA adoption depends on the existing organizational structure.

H0: There is no relationship between the reason for SOA transformation “Increasing revenue” and the existing organizational structure.

H1: There is a relationship between the reason for SOA transformation “Increasing revenue” and the existing organizational structure.

Table 58: Chi-square Test Results: Increasing Revenue versus Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 3.575 ^a | 2 | .167 | .202 | | |
| Likelihood Ratio | 5.253 | 2 | .072 | .117 | | |
| Fisher's Exact Test | 3.501 | | | .202 | | |
| Linear-by-Linear Association | 3.453 ^b | 1 | .063 | .076 | .040 | .026 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 1.85. | | | | | | |
| b. The standardized statistic is 1.858. | | | | | | |

Cross tabulation is used as the analysis technique. As 3 cells have expected count less than 5, sigma of fisher’s test is used. Sigma (0.202) is greater than 0.05, so H0 can not be rejected which means there is not a statistically significant difference. For this reason we can conclude that increasing revenue is not a reason for SOA adoption which depends on the existing organizational structure.

H0: There is no relationship between the reason for SOA transformation “Better integration of processes/information with customers/suppliers” and the existing organizational structure.

H1: There is a relationship between the reason for SOA transformation “Better integration of processes/information with customers/suppliers” and the existing organizational structure.

Table 59: Chi-square Test Results: Better Integration of Processes/Information with Customers/Suppliers versus Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.930 ^a | 2 | .381 | .457 | | |
| Likelihood Ratio | 1.967 | 2 | .374 | .457 | | |
| Fisher's Exact Test | 1.935 | | | .457 | | |
| Linear-by-Linear Association | 1.690 ^b | 1 | .194 | .208 | .122 | .046 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 2.65. | | | | | | |
| b. The standardized statistic is 1.300. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables. As 3 cells have expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.457) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 can not be rejected which means the reason to better integrate processes/information with customers/suppliers for SOA adoption does not depend on the existing organizational structure.

H0: There is no relationship between the reason for SOA transformation “Fostering software (service) reuse” and the existing organizational structure.

H1: There is a relationship between the reason for SOA transformation “Fostering software (service) reuse” and the existing organizational structure.

Table 60: Chi-square Test Results: Fostering Software (Service) Reuse versus Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|-------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .649 ^a | 2 | .723 | .813 | | |
| Likelihood Ratio | .672 | 2 | .715 | .813 | | |
| Fisher's Exact Test | .690 | | | .813 | | |
| Linear-by-Linear Association | .418 ^b | 1 | .518 | .595 | .315 | .083 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 2.91. | | | | | | |
| b. The standardized statistic is -.646. | | | | | | |

Cross tabulation is used as the analysis technique. As 3 cells have expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.813) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05.

Therefore, H0 can not be rejected which means the reason to foster software (service) usage for SOA transformation does not depend on the existing organizational structure.

H0: There is no relationship between the reason for SOA transformation “Lowering IT Operating Costs” and the existing organizational structure.

H1: There is a relationship between the reason for SOA transformation “Lowering IT Operating Costs” and the existing organizational structure.

Table 61: Chi-square Test Results: Lowering IT Operating Costs versus Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|-------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .405 ^a | 2 | .817 | .909 | | |
| Likelihood Ratio | .406 | 2 | .816 | .909 | | |
| Fisher's Exact Test | .493 | | | .909 | | |
| Linear-by-Linear Association | .000 ^b | 1 | .990 | 1.000 | .545 | .086 |
| N of Valid Cases | 34 | | | | | |
| a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 4.24. | | | | | | |
| b. The standardized statistic is .012. | | | | | | |

Cross tabulation is used as the analysis technique. As 2 cells have expected count less than 5, sigma of fisher’s test is used. Sigma (0.909) is way over than 0.05, so H0 can not be rejected which means there is not a statistically significant difference. For this reason we can conclude that lowering IT operating costs is not a reason for SOA adoption which depends on the existing organizational structure.

H0: There is no relationship between the reason for SOA transformation “Supporting ever-changing business environment to become more agile” and extent of the SOA transformation.

H1: There is a relationship between the reason for SOA transformation “Supporting ever-changing business environment to become more agile” and extent of the SOA transformation.

Table 62: Chi-square Test Results: Supporting Ever-changing Business Environment to Become More Agile versus Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|--------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 6.081 ^a | 1 | .014 | .029 | .029 | |
| Continuity Correction ^b | 3.796 | 1 | .051 | | | |
| Likelihood Ratio | 5.748 | 1 | .017 | .029 | .029 | |
| Fisher's Exact Test | | | | .029 | .029 | |
| Linear-by-Linear Association | 5.902 ^c | 1 | .015 | .029 | .029 | .027 |
| N of Valid Cases | 34 | | | | | |
| a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.62. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is 2.429. | | | | | | |

Cross tabulation is used as the analysis technique. As 2 cells have expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.029), which is less than 0.05, it can be concluded that there is a statistically significant difference and the H0 hypothesis is rejected. As a result, selection of “Supporting ever-changing business environment to become more agile” as a reason to start SOA adoption depends on whether the it is enterprise level, divisional level or it started as single, isolated projects.

H0: There is no relationship between the reason for SOA transformation “Enhancing internal operational process efficiency and flexibility” and the extent of the SOA transformation.

H1: There is a relationship between the reason for SOA transformation “Enhancing internal operational process efficiency and flexibility” and the extent of the SOA transformation.

Table 63: Chi-square Test results: Enhancing Internal Operational Process Efficiency and Flexibility versus Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|--------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 2.475 ^a | 1 | .116 | .178 | .132 | |
| Continuity Correction ^b | 1.254 | 1 | .263 | | | |
| Likelihood Ratio | 2.342 | 1 | .126 | .178 | .132 | |
| Fisher's Exact Test | | | | .178 | .132 | |
| Linear-by-Linear Assoc. | 2.402 ^c | 1 | .121 | .178 | .132 | .109 |
| N of Valid Cases | 34 | | | | | |
| a. 2 cells (50%) have expected count less than 5. The minimum expected count is 2.26. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is 1.550. | | | | | | |

Cross tabulation is used as the analysis technique. As 2 cells have expected count less than 5, sigma of fisher’s test is used. Sigma (0.178) is greater than 0.05, so H0 can not be rejected which means there is not a statistically significant difference. For this reason we can conclude that enhancing internal operational process efficiency and flexibility is not a reason for SOA adoption which depends on the extent of SOA transformation.

H0: There is no relationship between the reason for SOA transformation “Improving quality of IT systems” and extent of the SOA transformation.

H1: There is a relationship between the reason for SOA transformation “Improving quality of IT systems” and extent of the SOA transformation.

Table 64: Chi-square Test Results: Improving Quality of IT Systems versus Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 3.011 ^a | 1 | .083 | .111 | .095 | |
| Continuity Correction ^b | 1.742 | 1 | .187 | | | |
| Likelihood Ratio | 2.887 | 1 | .089 | .111 | .095 | |
| Fisher's Exact Test | | | | .111 | .095 | |
| Linear-by-Linear Association | 2.922 ^c | 1 | .087 | .111 | .095 | .078 |
| N of Valid Cases | 34 | | | | | |
| a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.91. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is -1.709. | | | | | | |

Cross tabulation is used as the analysis technique. As 1 cell has expected count less than 5, sigma of fisher’s test is used. Sigma (0.111) is greater than 0.05, so H0 can not be rejected which means there is not a statistically significant difference. For this reason we can conclude that improving quality of IT systems is not a reason for SOA adoption which depends on the extent of SOA transformation.

H0: There is no relationship between the reason for SOA transformation “Increasing revenue” and extent of the SOA transformation.

H1: There is a relationship between the reason for SOA transformation “Increasing revenue” and extent of the SOA transformation.

Table 65: Chi-square Test Results: Increasing Revenue versus Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|-------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .444 ^a | 1 | .505 | .656 | .404 | |
| Continuity Correction ^b | .046 | 1 | .831 | | | |
| Likelihood Ratio | .430 | 1 | .512 | .656 | .404 | |
| Fisher's Exact Test | | | | .656 | .404 | |
| Linear-by-Linear Association | .431 ^c | 1 | .511 | .656 | .404 | .272 |
| N of Valid Cases | 34 | | | | | |
| a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.26. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is -.657. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables.

As 2 cells have expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.656) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 can not be rejected which means the reason to increase revenue for SOA adoption does not depend on the extent of SOA transformation.

H0: There is no relationship between the reason for SOA transformation “Better integration of processes/information with customers/suppliers” and extent of the SOA transformation.

H1: There is a relationship between the reason for SOA transformation “Better integration of processes/information with customers/suppliers” and extent of the SOA transformation.

Table 66: Chi-square Test Results: Better Integration of Processes/Information with Customers/Suppliers versus Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .988 ^a | 1 | .320 | .437 | .283 | |
| Continuity Correction ^b | .350 | 1 | .554 | | | |
| Likelihood Ratio | 1.043 | 1 | .307 | .437 | .283 | |
| Fisher's Exact Test | | | | .437 | .283 | |
| Linear-by-Linear Assoc. | .959 ^c | 1 | .328 | .437 | .283 | .206 |
| N of Valid Cases | 34 | | | | | |
| a. 1 cells (25%) have expected count less than 5. The minimum expected count is 3.24. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is -.979. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables. As 1 cell has expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.437) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 can not be rejected which means the reason to better integrate processes/information with customers/suppliers for SOA adoption does not depend on the extent of SOA transformation.

H0: There is no relationship between the reason for SOA transformation “Fostering software (service) reuse” and extent of the SOA transformation.

H1: There is a relationship between the reason for SOA transformation “Fostering software (service) reuse” and extent of the SOA transformation.

Table 67: Chi-square Test Results: Fostering Software (Service) Reuse versus Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|---------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 12.111 ^a | 1 | .001 | .001 | .001 | |
| Continuity Correction ^b | 9.538 | 1 | .002 | | | |
| Likelihood Ratio | 12.103 | 1 | .001 | .001 | .001 | |
| Fisher's Exact Test | | | | .001 | .001 | |
| Linear-by-Linear Association | 11.755 ^c | 1 | .001 | .001 | .001 | .001 |
| N of Valid Cases | 34 | | | | | |
| a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.56. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is 3.429. | | | | | | |

Cross tabulation is used as the analysis technique. As 1 cell has expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.001), which is less than 0.05, it can be concluded that there is a statistically significant difference and the H0 hypothesis is rejected. As a result, selection of “Fostering software (service) reuse” as a reason to start SOA adoption depends on the extent of the SOA transformation.

H0: There is no relationship between the reason for SOA transformation “Lowering IT Operating Costs” and the extent of the SOA transformation.

H1: There is a relationship between the reason for SOA transformation “Lowering IT Operating Costs” and the extent of the SOA transformation.

Table 68: Chi-square Test Results: Lowering IT Operating Costs versus Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .366 ^a | 1 | .545 | .717 | .406 | |
| Continuity Correction ^b | .056 | 1 | .812 | | | |
| Likelihood Ratio | .366 | 1 | .545 | .717 | .406 | |
| Fisher's Exact Test | | | | .717 | .406 | |
| Linear-by-Linear Association | .355 ^c | 1 | .551 | .717 | .406 | .240 |
| N of Valid Cases | 34 | | | | | |
| a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.18. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is -.596. | | | | | | |

Cross tabulation is used as the analysis technique. No cell has expected count less than 5, so sigma of pearson chi-square test is used. Sigma (0.717) is greater than 0.05, so H0 can not be rejected which means there is not a statistically significant difference. For this reason we can conclude that lowering of IT operating costs is not a reason for SOA adoption which depends on the extent of SOA transformation.

H0: SOA does not require changes in the organizational structure.

H1: SOA requires changes in the organizational structure.

To be able to find out whether SOA requires changes in the organizational structure or not, the number of responses which indicates any change in the organization and which does not is identified. If at least one of the changes in question 7 is selected, this means organization did some changes; otherwise it is considered as nothing changed. When chi-square test is applied to this new parameter, following result is obtained:

Table 69: Frequency of Parameter Indicating whether a Change in the Organizational Structure Needed or not

| Change in the organizational structure needed? | | | |
|------------------------------------------------|------------|------------|----------|
| | Observed N | Expected N | Residual |
| Yes | 30 | 17.0 | 13.0 |
| No | 4 | 17.0 | -13.0 |
| Total | 34 | | |

Table 70: Chi-square Test Results for the Parameter Indicating whether a Change in the Organizational Structure Needed or not

| Test Statistics | |
|------------------------------------------------------------------------------------------------------|------------------------------------------------|
| | Change in the organizational structure needed? |
| Chi-Square | 19.882 ^a |
| df | 1 |
| Asymp. Sig. | .000 |
| a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0. | |

As sigma is 0.000, there is a difference at 5% significance level ($0.05 > 0.000$), therefore H0 hypothesis is rejected. This means that SOA requires changes in the organizational structure.

H0: Organizational changes do not depend on the current structure of the organization.

H1: Organizational changes depend on the current structure of the organization.

Cross tabulation has been applied to test this hypothesis. The results are as follows:

Table 71: Frequencies for Dependency of Organizational Structure to Existing Structure

| Change in the organizational structure needed? * What kind of organizational structure have your organization had when you started SOA Transformation Crosstabulation | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------|------------|--------|-------|
| Count | | Existing Organizational Structure | | | Total |
| | | Functional | Divisional | Matrix | |
| Change in the organizational structure needed? | Yes | 10 | 11 | 9 | 30 |
| | No | 2 | 2 | 0 | 4 |
| Total | | 12 | 13 | 9 | 34 |

Table 72: Chi-square Test Results for Dependency of Organizational Structure to Existing Structure

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|--------------------|----|----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.642 ^a | 2 | .440 | .531 | | |
| Likelihood Ratio | 2.654 | 2 | .265 | .531 | | |
| Fisher's Exact Test | 1.530 | | | .531 | | |
| Linear-by-Linear Assoc. | 1.534 ^b | 1 | .216 | .292 | .183 | .111 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50%) have expected count less than 5. The minimum expected count is 1.06. | | | | | | |
| b. The standardized statistic is -1.239. | | | | | | |

As sigma is 0.531, which is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 can not be rejected which means organizational changes introduced by SOA do not depend on the current structure of the organization.

H0: There is no relationship between the organizational change “creation of a project-oriented organization structure for the development of new distributed processes” and the existing organizational structure.

H1: There is a relationship between the organizational change “creation of a project-oriented organization structure for the development of new distributed processes” and the existing organizational structure.

Cross tabulation is applied for this hypothesis. However in this case, fisher’s exact test is used instead of pearson chi-square test as there are 3 cells which have expected count less than 5, which is against one of the main assumptions of pearson chi-square test.

Table 73: Chi-square Test Results: Creation of Project-oriented Organization Structure for the Development of New Distributed Processes versus the Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .269 ^a | 2 | .874 | .908 | | |
| Likelihood Ratio | .269 | 2 | .874 | .908 | | |
| Fisher's Exact Test | .385 | | | .908 | | |
| Linear-by-Linear Assoc. | .244 | 1 | .621 | .665 | .354 | .089 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50%) have expected count less than 5. The minimum expected count is 3.44. | | | | | | |

As sigma (0.908) is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 can not be rejected which means creation of project-oriented organization structure for the development of new distributed processes in the organization introduced by SOA transformation as a change does not depend on the existing structure of the organization.

H0: There is no relationship between the organizational change “introduction of some cross-domain departments to be able to maintain the cross-department functionality” and the existing organizational structure.

H1: There is a relationship between the organizational change “introduction of some cross-domain departments to be able to maintain the cross-department functionality” and the existing organizational structure.

Table 74: Chi-square Test Results: Introduction of Some Cross-domain Departments to be able to Maintain the Cross-department Functionality versus the Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.636 ^a | 2 | .441 | .496 | | |
| Likelihood Ratio | 1.627 | 2 | .443 | .557 | | |
| Fisher's Exact Test | 1.561 | | | .496 | | |
| Linear-by-Linear Association | .000 ^b | 1 | .994 | 1.000 | .518 | .075 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50%) have expected count less than 5. The minimum expected count is 2.38. | | | | | | |
| b. The standardized statistic is -.007. | | | | | | |

Cross tabulation is applied for this hypothesis. Fisher’s exact test is used instead of pearson chi-square test as there are 3 cells which have expected count less than 5. As sigma (0.496), which is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 can not be rejected which means introduction of some cross-domain departments to be able to maintain the cross-department functionality in the organization introduced by SOA transformation as a change does not depend on the existing structure of the organization.

H0: There is no relationship between the organizational change “foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities” and the existing organizational structure.

H1: There is a relationship between the organizational change “foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities” and the existing organizational structure.

Table 75: Chi-square Test Results: Foundation of SOA Center of Excellence, Integration Competence Center or Similar to Centralize SOA Activities versus the Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 4.153 ^a | 2 | .125 | .160 | | |
| Likelihood Ratio | 3.970 | 2 | .137 | .175 | | |
| Fisher's Exact Test | 3.767 | | | .175 | | |
| Linear-by-Linear Association | 3.992 ^b | 1 | .046 | .052 | .036 | .018 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50%) have expected count less than 5. The minimum expected count is 2.65. | | | | | | |
| b. The standardized statistic is -1.998. | | | | | | |

Cross tabulation technique is used to analyze this hypothesis. There are 3 cells which have expected count less than 5, so fisher’s exact test is used to find out sigma. As sigma (0.175), which is greater than 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 is accepted which means foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities in the organization introduced by SOA transformation as a change does not depend on the existing structure of the organization.

H0: There is no relationship between the organizational change “moving from hierarchical organizational structures to more horizontal structures” and the existing organizational structure.

H1: There is a relationship between the organizational change “moving from hierarchical organizational structures to more horizontal structures” and the existing organizational structure.

Table 76: Chi-square Test Results: Moving from Hierarchical Organizational Structures to More Horizontal Structures versus the Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.616 ^a | 2 | .446 | .490 | | |
| Likelihood Ratio | 1.569 | 2 | .456 | .490 | | |
| Fisher's Exact Test | 1.516 | | | .490 | | |
| Linear-by-Linear Association | .436 ^b | 1 | .509 | .560 | .299 | .097 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50%) have expected count less than 5. The minimum expected count is 1.32. | | | | | | |
| b. The standardized statistic is .660. | | | | | | |

As sigma obtained from fisher’s exact test (0.490) is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 can not be rejected which means moving from hierarchical organizational structures to more horizontal structures in the organization introduced by SOA transformation as a change does not depend on the existing structure of the organization.

H0: There is no relationship between the organizational change “improving the relationship between business units and IT” and the existing organizational structure.

H1: There is a relationship between the organizational change “improving the relationship between business units and IT” and the existing organizational structure.

Table 77: Chi-square Test Results: Improving the Relationship between Business Units and IT versus the Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.393 ^a | 2 | .498 | .489 | | |
| Likelihood Ratio | 1.438 | 2 | .487 | .489 | | |
| Fisher's Exact Test | 1.468 | | | .489 | | |
| Linear-by-Linear Association | .143 ^b | 1 | .705 | .733 | .391 | .069 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 3.18. | | | | | | |
| b. The standardized statistic is .378. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables.

As 3 cells have expected count less than 5, sigma of fisher’s exact test is used.

According to this sigma (0.489) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 is accepted which means improving the relationship between business units and IT in the organization introduced by SOA transformation as a change does not depend on the existing structure of the organization.

H0: There is no relationship between the organizational change “creation of a new operating process in IT organization for service management” and the existing organizational structure.

H1: There is a relationship between the organizational change “creation of a new operating process in IT organization for service management” and the existing organizational structure.

Table 78: Chi-square Test Results: Creation of a New Operating Process in IT Organization for Service Management versus the Existing Organizational Structure

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.572 ^a | 2 | .456 | .504 | | |
| Likelihood Ratio | 1.544 | 2 | .462 | .504 | | |
| Fisher's Exact Test | 1.561 | | | .504 | | |
| Linear-by-Linear Association | 1.319 ^b | 1 | .251 | .288 | .158 | .050 |
| N of Valid Cases | 34 | | | | | |
| a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 3.44. | | | | | | |
| b. The standardized statistic is -1.148. | | | | | | |

As sigma obtained from fisher’s exact test (0.504) is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 can not be rejected which means creation of a new operating process in IT organization for service management in the organization introduced by SOA transformation as a change is independent from the existing structure of the organization.

H0: There is no relationship between the organizational change “creation of a project-oriented organization structure for the development of new distributed processes” and the success of the SOA transformation.

H1: There is a relationship between the organizational change “creation of a project-oriented organization structure for the development of new distributed processes” and the success of the SOA transformation.

Table 79: Chi-square Test Results: Creation of Project-oriented Organization Structure for the Development of New Distributed Processes versus the Success of the SOA Transformation

| Chi-Square Tests | | | | | | |
|----------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 2.280 ^a | 3 | .516 | .593 | | |
| Likelihood Ratio | 2.932 | 3 | .402 | .593 | | |
| Fisher's Exact Test | 2.075 | | | .592 | | |
| Linear-by-Linear Association | 1.655 ^b | 1 | .198 | .258 | .146 | .081 |
| N of Valid Cases | 34 | | | | | |
| a. 6 cells (75.0%) have expected count less than 5. The minimum expected count is .76. | | | | | | |
| b. The standardized statistic is 1.287. | | | | | | |

Cross tabulation is used for the analysis of this hypothesis. As 6 cells have expected count less than 5, sigma of fisher’s exact test is used. According to this sigma (0.592) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 can not be rejected. As a result, the success of the SOA transformation is independent from creation of project-oriented organization structure for the development of new distributed processes.

H0: There is no relationship between the organizational change “introduction of some cross-domain departments to be able to maintain the cross-department functionality” and the success of the SOA transformation.

H1: There is a relationship between the organizational change “introduction of some cross-domain departments to be able to maintain the cross-department functionality” and the success of the SOA transformation.

Table 80: Chi-square Test Results: Introduction of Some Cross-domain Departments to be able to Maintain the Cross-department Functionality versus the Success of the SOA Transformation

| Chi-Square Tests | | | | | | |
|--------------------------------------------------------------------------------------|--------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 2.286 ^a | 3 | .515 | .555 | | |
| Likelihood Ratio | 2.204 | 3 | .531 | .605 | | |
| Fisher's Exact Test | 3.078 | | | .307 | | |
| Linear-by-Linear Association | .369 ^b | 1 | .544 | .694 | .341 | .131 |
| N of Valid Cases | 34 | | | | | |
| a. 6 cells (75%) have expected count less than 5. The minimum expected count is .53. | | | | | | |
| b. The standardized statistic is -.607. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables.

As 6 cells have expected count less than 5, sigma of fisher’s exact test is used.

According to this sigma (0.307) it can be concluded that there is not a statistically

significant difference as sigma is greater than 0.05. For this reason, H0 is accepted

which means the success of the SOA transformation does not depend on the introduction of cross-domain departments to be able to maintain the cross-department functionality.

H0: There is no relationship between the organizational change “foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities” and the success of the SOA transformation.

H1: There is a relationship between the organizational change “foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities” and the success of the SOA transformation.

Table 81: Chi-square Test Results: Foundation of SOA Center of Excellence, Integration Competence Center or Similar to Centralize SOA Activities versus the Success of the SOA Transformation

| Chi-Square Tests | | | | | | |
|--------------------------------------------------------------------------------------|--------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.378 ^a | 3 | .711 | .821 | | |
| Likelihood Ratio | 1.938 | 3 | .585 | .781 | | |
| Fisher's Exact Test | 1.192 | | | 1.000 | | |
| Linear-by-Linear Assoc. | 1.326 ^b | 1 | .249 | .317 | .184 | .107 |
| N of Valid Cases | 34 | | | | | |
| a. 6 cells (75%) have expected count less than 5. The minimum expected count is .59. | | | | | | |
| b. The standardized statistic is 1.152. | | | | | | |

Cross tabulation is used for the analysis of this hypothesis. As 6 cells have expected count less than 5, sigma of fisher’s exact test is used. According to this sigma (1.000) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 can not be rejected. As a result, the success of the SOA transformation is independent from the foundation of SOA center of excellence, integration competence center or similar to centralize SOA activities.

H0: There is no relationship between the organizational change “moving from hierarchical organizational structures to more horizontal structures” and the success of the SOA transformation.

H1: There is a relationship between the organizational change “moving from hierarchical organizational structures to more horizontal structures” and the success of the SOA transformation.

Table 82: Chi-square Test Results: Moving from Hierarchical Organizational Structures to More Horizontal Structures versus the Success of the SOA Transformation

| Chi-Square Tests | | | | | | |
|----------------------------------------------------------------------------------------|--------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.531 ^a | 3 | .675 | .862 | | |
| Likelihood Ratio | 2.529 | 3 | .470 | .820 | | |
| Fisher's Exact Test | 1.296 | | | .862 | | |
| Linear-by-Linear Association | .004 ^b | 1 | .950 | 1.000 | .516 | .190 |
| N of Valid Cases | 34 | | | | | |
| a. 7 cells (87.5%) have expected count less than 5. The minimum expected count is .29. | | | | | | |
| b. The standardized statistic is -.063. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables.

As 7 cells have expected count less than 5, sigma of fisher’s exact test is used.

According to this sigma (0.862) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 is accepted which means moving from hierarchical organizational structures to more horizontal structures does not have an impact on the success of the SOA transformation.

H0: There is no relationship between the organizational change “improving the relationship between business units and IT” and the success of the SOA transformation.

H1: There is a relationship between the organizational change “improving the relationship between business units and IT” and the success of the SOA transformation.

Table 83: Chi-square Test Results: Improving the Relationship between Business Units and IT versus the Success of the SOA Transformation

| Chi-Square Tests | | | | | | |
|----------------------------------------------------------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 6.414 ^a | 3 | .093 | .087 | | |
| Likelihood Ratio | 8.646 | 3 | .034 | .065 | | |
| Fisher's Exact Test | 5.533 | | | .096 | | |
| Linear-by-Linear Association | .197 ^b | 1 | .657 | .711 | .419 | .139 |
| N of Valid Cases | 34 | | | | | |
| a. 6 cells (75.0%) have expected count less than 5. The minimum expected count is .71. | | | | | | |
| b. The standardized statistic is -.444. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables.

As 6 cells have expected count less than 5, sigma of fisher’s exact test is used.

According to this sigma (0.096) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 is accepted which means the success of the SOA transformation does not depend on improving the relationship between business units and IT.

H0: There is no relationship between the organizational change “creation of a new operating process in IT organization for service management” and the success of the SOA transformation.

H1: There is a relationship between the organizational change “creation of a new operating process in IT organization for service management” and the success of the SOA transformation.

Table 84: Chi-square Test Results: Creation of a New Operating Process in IT Organization for Service Management versus the Success of the SOA Transformation

| Chi-Square Tests | | | | | | |
|----------------------------------------------------------------------------------------|--------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | 1.318 ^a | 3 | .725 | .824 | | |
| Likelihood Ratio | 2.007 | 3 | .571 | .681 | | |
| Fisher's Exact Test | 1.192 | | | .931 | | |
| Linear-by-Linear Association | .803 ^b | 1 | .370 | .457 | .258 | .113 |
| N of Valid Cases | 34 | | | | | |
| a. 6 cells (75.0%) have expected count less than 5. The minimum expected count is .76. | | | | | | |
| b. The standardized statistic is .896. | | | | | | |

As sigma obtained from fisher’s exact test (0.931) is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 can not be rejected which means the success of the SOA transformation is independent from creation of a new operating process in IT organization for service management.

H0: There is no relationship between the organizational change “creation of a project-oriented organization structure for the development of new distributed processes” and the extent of the SOA transformation.

H1: There is a relationship between the organizational change “creation of a project-oriented organization structure for the development of new distributed processes” and the extent of the SOA transformation.

Table 85: Chi-square Test Results: Creation of Project-oriented Organization Structure for the Development of New Distributed Processes Versus the Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .827 ^a | 1 | .363 | .465 | .301 | |
| Continuity Correction ^b | .284 | 1 | .594 | | | |
| Likelihood Ratio | .851 | 1 | .356 | .465 | .301 | |
| Fisher's Exact Test | | | | .465 | .301 | |
| Linear-by-Linear Association | .803 ^c | 1 | .370 | .465 | .301 | .203 |
| N of Valid Cases | 34 | | | | | |
| a. 1 cells (25%) have expected count less than 5. The minimum expected count is 4.21. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is .896. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables.

As 1 cell has expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.465) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 can not be rejected which means creation of project-oriented organization structure for the development of new distributed processes during SOA adoption does not depend on the extent of SOA transformation.

H0: There is no relationship between the organizational change “introduction of some cross-domain departments to be able to maintain the cross-department functionality” and the extent of the SOA transformation.

H1: There is a relationship between the organizational change “introduction of some cross-domain departments to be able to maintain the cross-department functionality” and the extent of the SOA transformation.

Table 86: Chi-square Test Results: Introduction of Cross-domain Departments to Maintain the Cross-department Functionality versus Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .818 ^a | 1 | .366 | .425 | .307 | |
| Continuity Correction ^b | .239 | 1 | .625 | | | |
| Likelihood Ratio | .793 | 1 | .373 | .425 | .307 | |
| Fisher's Exact Test | | | | .425 | .307 | |
| Linear-by-Linear Assoc. | .794 ^c | 1 | .373 | .425 | .307 | .212 |
| N of Valid Cases | 34 | | | | | |
| a. 1 cells (25%) have expected count less than 5. The minimum expected count is 2.91. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is -.891. | | | | | | |

As sigma obtained from fisher’s exact test (0.425) is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 can not be rejected which means the introduction of some cross-domain departments to be able to maintain the cross-department functionality as a change for SOA transformation does not depend on the extent of SOA transformation.

H0: There is no relationship between the organizational change “foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities” and extent of the SOA transformation.

H1: There is a relationship between the organizational change “foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities” and extent of the SOA transformation.

Table 87: Chi-square Test Results: Foundation of SOA Center of Excellence, Integration Competence Center or Similar to Centralize SOA Activities versus the Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .036 ^a | 1 | .850 | 1.000 | .591 | |
| Continuity Correction ^b | .000 | 1 | 1.000 | | | |
| Likelihood Ratio | .036 | 1 | .849 | 1.000 | .591 | |
| Fisher's Exact Test | | | | 1.000 | .591 | |
| Linear-by-Linear Association | .035 ^c | 1 | .852 | 1.000 | .591 | .308 |
| N of Valid Cases | 34 | | | | | |
| a. 1 cells (25%) have expected count less than 5. The minimum expected count is 3.24. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is .187. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables. As 1 cell has expected count less than 5, sigma of fisher’s test is used. According to this sigma (1.000) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. Hence, H0 can not be rejected which means foundation of SOA center of excellence, integration competence center or similar to centralize SOA activities during SOA adoption does not depend on the extent of SOA transformation.

H0: There is no relationship between the organizational change “moving from hierarchical organizational structures to more horizontal structures” and the extent of the SOA transformation.

H1: There is a relationship between the organizational change “moving from hierarchical organizational structures to more horizontal structures” and the extent of the SOA transformation.

Table 88: Chi-square Test Results: Moving from Hierarchical Organizational Structures to More Horizontal Structures versus the Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .157 ^a | 1 | .692 | 1.000 | .529 | |
| Continuity Correction ^b | .000 | 1 | 1.000 | | | |
| Likelihood Ratio | .152 | 1 | .696 | 1.000 | .529 | |
| Fisher's Exact Test | | | | 1.000 | .529 | |
| Linear-by-Linear Assoc. | .152 ^c | 1 | .697 | 1.000 | .529 | .350 |
| N of Valid Cases | 34 | | | | | |
| a. 2 cells (50%) have expected count less than 5. The minimum expected count is 1.62. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is -.390. | | | | | | |

As sigma obtained from fisher’s exact test (1.000) is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 can not be rejected which means moving from hierarchical organizational structures to more horizontal structures as a change for SOA transformation does not depend on the extent of SOA transformation.

H0: There is no relationship between the organizational change “improving the relationship between business units and IT” and the extent of the SOA transformation.

H1: There is a relationship between the organizational change “improving the relationship between business units and IT” and the extent of the SOA transformation.

Table 89: Chi-square Test Results: Improving the Relationship between Business Units and IT versus the Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|-----------------------------------------------------------------------------------------|-------------------|----|-----------------------|----------------------|----------------------|-------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .458 ^a | 1 | .498 | .705 | .390 | |
| Continuity Correction ^b | .086 | 1 | .769 | | | |
| Likelihood Ratio | .469 | 1 | .494 | .705 | .390 | |
| Fisher's Exact Test | | | | .705 | .390 | |
| Linear-by-Linear Association | .445 ^c | 1 | .505 | .705 | .390 | .246 |
| N of Valid Cases | 34 | | | | | |
| a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.88. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is -.667. | | | | | | |

Cross tabulation is used to be able to understand the relationship of these two variables. As 1 cell has expected count less than 5, sigma of fisher’s test is used. According to this sigma (0.705) it can be concluded that there is not a statistically significant difference as sigma is greater than 0.05. For this reason, H0 can not be rejected which means improving the relationship between business units and IT as a change for SOA adoption does not depend on the extent of SOA transformation.

H0: There is no relationship between the organizational change “creation of a new operating process in IT organization for service management” and the extent of the SOA transformation.

H1: There is a relationship between the organizational change “creation of a new operating process in IT organization for service management” and the extent of the SOA transformation.

Table 90: Chi-square Test Results: Creation of a New Operating Process in IT Organization for Service Management versus the Extent of the SOA Transformation

| Chi-Square Tests | | | | | | |
|---------------------------------------------------------------------------------------|-------------------|----|-------------------------|-------------------------|-------------------------|----------------------|
| | Value | df | Asymp.Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
| Pearson Chi-Square | .827 ^a | 1 | .363 | .465 | .301 | |
| Continuity Correction ^b | .284 | 1 | .594 | | | |
| Likelihood Ratio | .851 | 1 | .356 | .465 | .301 | |
| Fisher's Exact Test | | | | .465 | .301 | |
| Linear-by-Linear Assoc. | .803 ^c | 1 | .370 | .465 | .301 | .203 |
| N of Valid Cases | 34 | | | | | |
| a. 1 cells (25%) have expected count less than 5. The minimum expected count is 4.21. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |
| c. The standardized statistic is .896. | | | | | | |

As sigma obtained from fisher’s exact test (0.465) is significantly over 0.05, it can be concluded that there is not a statistically significant difference. For this reason, H0 is accepted which means creation of a new operating process in IT organization for service management as a change for SOA transformation does not depend on the extent of SOA transformation.

H0: SOA does not require changes in the funding model

H1: SOA requires changes in the funding model

To be able to find out whether SOA requires changes in the funding model or not, the number of responses which indicates any change in the funding model and which does not is identified. If at least one of the changes in question 8 is selected, this means organization did some changes in the funding model; otherwise it is considered as nothing changed. When chi-square test is applied to this new parameter, following result is obtained:

Table 91: Frequency of Parameter Indicating whether a Change in the Funding Model Needed or Not

| Change in the funding model needed? | | | |
|-------------------------------------|------------|------------|----------|
| | Observed N | Expected N | Residual |
| 1 | 29 | 17.0 | 12.0 |
| 2 | 5 | 17.0 | -12.0 |
| Total | 34 | | |

Table 92: Chi-square Test Results for the Parameter Indicating whether a Change in the Funding Model Needed or Not

| Test Statistics | |
|------------------------------------------------------------------------------------------------------|-------------------------------------|
| | Change in the funding model needed? |
| Chi-Square | 16.941 ^a |
| df | 1 |
| Asymp. Sig. | .000 |
| a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0. | |

As sigma is 0.000, there is a difference at 5% significance level ($0.05 > 0.000$), therefore H0 hypothesis is rejected. This means that SOA requires changes in the funding model.

H0: SOA does not require new "Support Roles" in the organization.

H1: SOA requires new "Support Roles" in the organization.

If at least one of the roles in question 9a is selected, this means organization created new support roles; otherwise it is considered as no new role is created. When Chi-square test is applied to this new parameter, following result is obtained:

Table 93: Frequency of Parameter Indicating whether New Support Role(s) are Needed or Not

| New support roles needed? | | | |
|---------------------------|------------|------------|----------|
| | Observed N | Expected N | Residual |
| 1 | 32 | 17.0 | 15.0 |
| 2 | 2 | 17.0 | -15.0 |
| Total | 34 | | |

Table 94: Chi-square Test Results for the Parameter Indicating whether New Support Role(s) are Needed or Not

| Test Statistics | |
|------------------------------------------------------------------------------------------------------|---------------------------|
| | New support roles needed? |
| Chi-Square | 26.471 ^a |
| df | 1 |
| Asymp. Sig. | .000 |
| a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0. | |

As sigma is 0.000, there is a difference at 5% significance level ($0.05 > 0.000$), therefore H0 hypothesis is rejected. This means that SOA transformation requires new support roles to be created within the organization.

H0: SOA does not require new "Strategy and Governance Roles" in the organization.

H1: SOA requires new "Strategy and Governance Roles" in the organization.

If at least one of the roles in question 9b is selected, this means organization created new strategy and governance roles; otherwise it is considered as no new role is created. When Chi-square test is applied to this new parameter, following result is obtained:

Table 95: Frequency of Parameter Indicating whether New Strategy Role(s) are Needed or Not

| New strategy roles needed? | | | |
|----------------------------|------------|------------|----------|
| | Observed N | Expected N | Residual |
| 1 | 30 | 17.0 | 13.0 |
| 2 | 4 | 17.0 | -13.0 |
| Total | 34 | | |

Table 96: Chi-square Test Results for the Parameter Indicating whether New Strategy Role(s) are Needed or Not

| Test Statistics | |
|------------------------------------------------------------------------------------------------------|----------------------------|
| | New strategy roles needed? |
| Chi-Square | 19.882 ^a |
| df | 1 |
| Asymp. Sig. | .000 |
| a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0. | |

As sigma is 0.000, there is a difference at 5% significance level ($0.05 > 0.000$), therefore H0 hypothesis is rejected. This means that SOA transformation requires new strategy and governance roles to be created within the organization.

H0: SOA does not require new "Design and Quality Management Roles" in the organization.

H1: SOA requires new "Design and Quality Management Roles" in the organization.

If at least one of the roles in question 9c is selected, this means organization created new design and quality management roles; otherwise it is considered as no new role is created. When Chi-square test is applied to this parameter, following result is obtained:

Table 97: Frequency of Parameter Indicating whether New Design Role(s) are Needed or Not

| New design roles needed? | | | |
|--------------------------|------------|------------|----------|
| | Observed N | Expected N | Residual |
| 1 | 33 | 17.0 | 16.0 |
| 2 | 1 | 17.0 | -16.0 |
| Total | 34 | | |

Table 98: Chi-square Test Results for the Parameter Indicating whether New Design Role(s) are Needed or Not

| Test Statistics | |
|------------------------------------------------------------------------------------------------------|--------------------------|
| | New design roles needed? |
| Chi-Square | 30.118 ^a |
| df | 1 |
| Asymp. Sig. | .000 |
| a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0. | |

As sigma is 0.000, there is a difference at 5% significance level ($0.05 > 0.000$), therefore H0 hypothesis is rejected. This means that SOA transformation requires new design and quality management roles to be created within the organization.

H0: SOA does not require new "Development and Evolution Roles" in the organization.

H1: SOA requires new "Development and Evolution Roles" in the organization.

If at least one of the roles in question 9d is selected, this means organization created new development and evolution roles; otherwise it is considered as no new role is created.

When Chi-square test is applied to this new parameter, following result is obtained:

Table 99: Frequency of Parameter Indicating whether New Development Role(s) are Needed or Not

| New development roles needed? | | | |
|-------------------------------|------------|------------|----------|
| | Observed N | Expected N | Residual |
| 1 | 31 | 17.0 | 14.0 |
| 2 | 3 | 17.0 | -14.0 |
| Total | 34 | | |

Table 100: Chi-square Test Results for the Parameter Indicating whether New Development Role(s) are Needed or Not

| Test Statistics | |
|------------------------------------------------------------------------------------------------------|-------------------------------|
| | New development roles needed? |
| Chi-Square | 23.059 ^a |
| df | 1 |
| Asymp. Sig. | .000 |
| a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0. | |

As sigma is 0.000, there is a difference at 5% significance level ($0.05 > 0.000$), therefore H0 hypothesis is rejected. This means that SOA transformation requires new development and evolution roles to be created within the organization.

H0: There is no difference between different levels of SOA transformation in the organization and the organization's perception of the impact of collaboration in SOA success.

H1: There is a difference between different levels of SOA transformation in the organization and the organization's perception of the impact of collaboration in SOA success.

A non-parametric test, K independent samples test, has been used to test this hypothesis. It is not possible to assume that the extent of SOA transformation fits to a distribution like normal distribution. Moreover, there are more than 2 independent groups. For this reasons, one of the non-parametric K independent sample tests, kruskal wallis test has been used for the analysis. Test variable is the ordinal variable which shows the organization's perception of the impact of collaboration in SOA success. Grouping variable is the level of SOA transformation in the organization which has 3 possible values, enterprise level, departmental/divisional level and single/isolated projects. As for the next 3 hypothesis (excluding the current one) same conditions are valid, similar testing will be applied. Following are the results of the analysis from SPSS output:

Table 101: Descriptive Statistics for Collaboration and Extent of SOA Transformation

| Descriptive Statistics | | | | | |
|----------------------------------------------------|----|------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| Collaboration | 34 | 4.03 | .904 | 2 | 5 |
| What is/was the extent of SOA in your organization | 34 | 1.32 | .475 | 1 | 2 |

Table 102: Ranks for Collaboration and Extent of SOA Transformation

| Ranks | | | |
|---------------|----------------------------------------------------|----|-----------|
| | What is/was the extent of SOA in your organization | N | Mean Rank |
| Collaboration | Enterprise level | 23 | 20.13 |
| | Departmental/divisional level | 11 | 12.00 |
| | Total | 34 | |

Table 103: Test Statistics for Collaboration and Extent of SOA Transformation

| Test Statistics ^{a,b} | |
|--------------------------------------------------------------------------|---------------|
| | Collaboration |
| Chi-Square | 5.561 |
| Df | 1 |
| Asymp. Sig. | .018 |
| Exact Sig. | .020 |
| Point Probability | .002 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: What is/was the extent of SOA in your organization | |

As sigma is 0.020, there is a difference at 5% significance level ($0.05 > 0.020$). Hence, H0 hypothesis is rejected. This means that the organization's perception of the impact of collaboration in SOA success do differ significantly by level of SOA transformation.

H0: There is no difference between different levels of SOA transformation in the organization and the organization's perception of the impact of management buy-in in SOA success.

H1: There is a difference between different levels of SOA transformation in the organization and the organization's perception of the impact of management buy-in in SOA success.

Table 104: Descriptive Statistics for Management Buy-in and Extent of SOA Transformation

| Descriptive Statistics | | | | | |
|----------------------------------------------------|----|------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| Management buy-in | 34 | 3.59 | .925 | 2 | 5 |
| What is/was the extent of SOA in your organization | 34 | 1.32 | .475 | 1 | 2 |

Table 105: Ranks for Management Buy-in and Extent of SOA Transformation

| Ranks | | | |
|-------------------|----------------------------------------------------|----|-----------|
| | What is/was the extent of SOA in your organization | N | Mean Rank |
| Management buy-in | Enterprise level | 23 | 17.63 |
| | Departmental/divisional level | 11 | 17.23 |
| | Total | 34 | |

Table 106: Test Statistics for Management Buy-in and Extent of SOA Transformation

| Test Statistics ^{a,b} | |
|--------------------------------------------------------------------------|-------------------|
| | Management buy-in |
| Chi-Square | .013 |
| Df | 1 |
| Asymp. Sig. | .908 |
| Exact Sig. | .958 |
| Point Probability | .036 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: What is/was the extent of SOA in your organization | |

As sigma is 0.908, there is no difference at 5% significance level ($0.05 < 0.908$). For this reason, H0 hypothesis can not be rejected. This means that the organization's perception of the impact of management buy-in in SOA success does not differ significantly by level of SOA transformation.

H0: There is no difference between different levels of SOA transformation in the organization and the organization's perception of the impact of IT staffing in SOA success.

H1: There is a difference between different levels of SOA transformation in the organization and the organization's perception of the impact of IT staffing in SOA success.

Table 107: Descriptive Statistics for IT Staffing and Extent of SOA Transformation

| Descriptive Statistics | | | | | |
|----------------------------------------------------|----|------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| IT Staffing | 34 | 3.29 | .906 | 1 | 5 |
| What is/was the extent of SOA in your organization | 34 | 1.32 | .475 | 1 | 2 |

Table 108: Ranks for IT Staffing and Extent of SOA Transformation

| Ranks | | | |
|-------------|----------------------------------------------------|----|-----------|
| | What is/was the extent of SOA in your organization | N | Mean Rank |
| IT Staffing | Enterprise level | 23 | 16.65 |
| | Departmental/divisional level | 11 | 19.27 |
| | Total | 34 | |

Table 109: Test Statistics for IT Staffing and Extent of SOA Transformation

| Test Statistics ^{a,b} | |
|--------------------------------------------------------------------------|-------------|
| | IT Staffing |
| Chi-Square | .582 |
| Df | 1 |
| Asymp. Sig. | .446 |
| Exact Sig. | .458 |
| Point Probability | .030 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: What is/was the extent of SOA in your organization | |

As sigma is 0.458, there is no difference at 5% significance level ($0.05 < 0.458$).

Therefore, H0 hypothesis can not be rejected. This means that the organization's perception of the impact of IT staffing in SOA success does not differ significantly by level of SOA transformation.

H0: There is no difference between different levels of SOA transformation in the organization and the organization's perception of the impact of organizational structure in SOA success.

H1: There is a difference between different levels of SOA transformation in the organization and the organization's perception of the impact of organizational structure in SOA success.

Table 110: Descriptive Statistics for Organizational Structure and Extent of SOA Transformation

| Descriptive Statistics | | | | | |
|------------------------------|----|------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| Organizational Structure | 34 | 3.21 | .880 | 2 | 5 |
| Extent of SOA Transformation | 34 | 1.32 | .475 | 1 | 2 |

Table 111: Ranks for Organizational structure and Extent of SOA Transformation

| Ranks | | | |
|--------------------------|-------------------------------|----|-----------|
| | Extent of SOA Transformation | N | Mean Rank |
| Organizational Structure | Enterprise level | 23 | 17.98 |
| | Departmental/divisional level | 11 | 16.50 |
| | Total | 34 | |

Table 112: Test Statistics: Organizational Structure and Extent of SOA Transformation

| Test Statistics ^{a,b} | |
|----------------------------------------------------|--------------------------|
| | Organizational Structure |
| Chi-Square | .183 |
| Df | 1 |
| Asymp. Sig. | .669 |
| Exact Sig. | .713 |
| Point Probability | .047 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: Extent of SOA Transformation | |

As sigma is 0.713, there is no difference at 5% significance level ($0.05 < 0.713$).

Therefore, H0 hypothesis can not be rejected. This means that the organization's perception of the impact of organizational structure in SOA success does not differ significantly by level of SOA transformation.

H0: There is no difference between different initial structure of the organization and the organization's perception of the impact of collaboration in SOA success.

H1: There is a difference between different initial structure of the organization and the organization's perception of the impact of collaboration in SOA success.

Similar to analysis of previous 4 hypotheses, K independent samples test, has been used to test this hypothesis. Same conditions as the previous 4 hypotheses are valid for this hypothesis and the next 3 hypotheses as it is not possible to assume that initial structure of the organization fits to a distribution and there are more than 2 independent groups.

As a result, kruskal wallis test has been used for the analysis as well. Test variable is the ordinal variable which shows the organization's perception of the impact of

collaboration in SOA success. Grouping variable is the initial structure of the organization which has 5 possible values, functional organization, divisional organization (based on products or product lines), divisional organization (based on geography), divisional organization (based on market) and matrix organization. As for the next 3 hypothesis (excluding the current one) same conditions are valid, similar testing will be applied. Following are the results of the analysis from SPSS output:

Table 113: Descriptive Statistics for Collaboration and Initial Structure of the Organization

| Descriptive Statistics | | | | | |
|------------------------------------------------------------------------------------------------------|----|------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| Collaboration | 34 | 4.03 | .904 | 2 | 5 |
| What kind of organizational structure have your organization had when you started SOA Transformation | 34 | 2.44 | 1.618 | 1 | 5 |

Table 114: Ranks for Collaboration and Initial Structure of the Organization

| Ranks | | | |
|---------------|------------------------------------------------------------------------------------------------------|----|-----------|
| | What kind of organizational structure have your organization had when you started SOA Transformation | N | Mean Rank |
| Collaboration | Functional Organization | 12 | 16.83 |
| | Divisional Organization | 13 | 18.15 |
| | Matrix Organization | 9 | 17.44 |
| | Total | 34 | |

Table 115: Test Statistics for Collaboration and Initial Structure of the Organization

| Test Statistics ^{a,b} | |
|----------------------------------------------------------------------------------------------------------------------------|---------------|
| | Collaboration |
| Chi-Square | .123 |
| Df | 2 |
| Asymp. Sig. | .940 |
| Exact Sig. | .949 |
| Point Probability | .002 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: What kind of organizational structure have your organization had when you started SOA Transformation | |

As sigma is 0.949, there is no difference at 5% significance level ($0.05 < 0.949$).

Therefore, H0 hypothesis can not be rejected. This means that the organization's perception of the impact of collaboration in SOA success does not differ significantly by the initial structure of the organization.

H0: There is no difference between different initial structure of the organization and the organization's perception of the impact of management buy-in in SOA success.

H1: There is a difference between different initial structure of the organization and the organization's perception of the impact of management buy-in in SOA success.

Table 116: Descriptive Statistics for Management Buy-in and Initial Structure of the Organization

| Descriptive Statistics | | | | | |
|------------------------------------------------------------------------------------------------------|----|------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| Management buy-in | 34 | 3.59 | .925 | 2 | 5 |
| What kind of organizational structure have your organization had when you started SOA Transformation | 34 | 2.44 | 1.618 | 1 | 5 |

Table 117: Ranks for Management Buy-in and Initial Structure of the Organization

| Ranks | | | |
|-------------------|------------------------------------------------------------------------------------------------------|----|-----------|
| | What kind of organizational structure have your organization had when you started SOA Transformation | N | Mean Rank |
| Management buy-in | Functional Organization | 12 | 20.08 |
| | Divisional Organization | 13 | 15.50 |
| | Matrix Organization | 9 | 16.94 |
| | Total | 34 | |

Table 118: Test Statistics for Management Buy-in and Initial Structure of the Organization

| Test Statistics ^{a,b} | |
|----------------------------------------------------------------------------------------------------------------------------|-------------------|
| | Management buy-in |
| Chi-Square | 1.501 |
| Df | 2 |
| Asymp. Sig. | .472 |
| Exact Sig. | .480 |
| Point Probability | .001 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: What kind of organizational structure have your organization had when you started SOA Transformation | |

As sigma is 0.480, there is no difference at 5% significance level ($0.05 < 0.480$). For this reason, H0 hypothesis can not be rejected. This means that the organization's perception of the impact of management buy-in in SOA success does not differ significantly by the initial structure of the organization.

H0: There is no difference between different initial structure of the organization and the organization's perception of the impact of IT staffing in SOA success.

H1: There is a difference between different initial structure of the organization and the organization's perception of the impact of IT staffing in SOA success.

Table 119: Descriptive Statistics for IT Staffing and Initial Structure of the Organization

| Descriptive Statistics | | | | | |
|------------------------------------------------------------------------------------------------------|----|------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| IT Staffing | 34 | 3.29 | .906 | 1 | 5 |
| What kind of organizational structure have your organization had when you started SOA Transformation | 34 | 2.44 | 1.618 | 1 | 5 |

Table 120: Ranks for IT Staffing and Initial Structure of the Organization

| Ranks | | | |
|-------------|------------------------------------------------------------------------------------------------------|----|-----------|
| | What kind of organizational structure have your organization had when you started SOA Transformation | N | Mean Rank |
| IT Staffing | Functional Organization | 12 | 17.42 |
| | Divisional Organization | 13 | 19.31 |
| | Matrix Organization | 9 | 15.00 |
| | Total | 34 | |

Table 121: Test Statistics for IT Staffing and Initial Structure of the Organization

| Test Statistics ^{a,b} | |
|----------------------------------------------------------------------------------------------------------------------------|-------------|
| | IT Staffing |
| Chi-Square | 1.125 |
| Df | 2 |
| Asymp. Sig. | .570 |
| Exact Sig. | .573 |
| Point Probability | .000 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: What kind of organizational structure have your organization had when you started SOA Transformation | |

As sigma is 0.570, there is no difference at 5% significance level ($0.05 < 0.570$). Hence, H0 hypothesis can not be rejected. This means that the organization's perception of the

impact of IT staffing in SOA success does not differ significantly by the initial structure of the organization.

H0: There is no difference between different initial structure of the organization and the organization's perception of the impact of organizational structure in SOA success.

H1: There is a difference between different initial structure of the organization and the organization's perception of the impact of organizational structure in SOA success.

Table 122: Descriptive Statistics for Organizational Structure and Initial Structure of the Organization

| Descriptive Statistics | | | | | |
|------------------------------------------------------------------------------------------------------|----|------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| Organizational Structure | 34 | 3.21 | .880 | 2 | 5 |
| What kind of organizational structure have your organization had when you started SOA Transformation | 34 | 2.44 | 1.618 | 1 | 5 |

Table 123: Ranks for Organizational Structure and Initial Structure of the Organization

| Ranks | | | |
|--------------------------|------------------------------------------------------------------------------------------------------|----|-----------|
| | What kind of organizational structure have your organization had when you started SOA Transformation | N | Mean Rank |
| Organizational Structure | Functional Organization | 12 | 22.21 |
| | Divisional Organization | 13 | 15.35 |
| | Matrix Organization | 9 | 14.33 |
| | Total | 34 | |

Table 124: Test Statistics for Organizational Structure and Initial Structure of the Organization

| Test Statistics ^{a,b} | |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------|
| | Organizational Structure |
| Chi-Square | 4.679 |
| Df | 2 |
| Asymp. Sig. | .096 |
| Exact Sig. | .099 |
| Point Probability | .000 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: What kind of organizational structure have your organization had when you started SOA Transformation | |

As sigma is 0.099, there is no difference at 5% significance level ($0.05 < 0.099$).

Therefore, H0 hypothesis can not be rejected. This means that the organization's perception of the impact of organizational structure in SOA success does not differ significantly by the initial structure of the organization.

Correlation Analysis

New Support Roles versus Initial Organization Structure

Table 125: Correlations: New Support Roles versus Initial Organization Structure

| Correlations | | | | |
|-------------------------------------------------------------|---------------------|------------------------------------|------------------------------------|--------------------------------|
| | | Functional organization flag | Divisional organization flag | Matrix organization flag |
| Business Process Support Assistant | Pearson Correlation | -.072 | -.101 | .189 |
| | Sig. (2-tailed) | .687 | .569 | .284 |
| | N | 34 | 34 | 34 |
| Business Process Assistant | Pearson Correlation | .394* | -.335 | -.058 |
| | Sig. (2-tailed) | .021 | .053 | .746 |
| | N | 34 | 34 | 34 |
| Business Process Manager | Pearson Correlation | .116 | -.103 | -.013 |
| | Sig. (2-tailed) | .513 | .563 | .944 |
| | N | 34 | 34 | 34 |
| Service Developer | Pearson Correlation | -.316 | .008 | .333 |
| | Sig. (2-tailed) | .069 | .962 | .054 |
| | N | 34 | 34 | 34 |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | |

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between the new support roles created within the organization and the initial structure of the organization. Only strong correlation is the positive relationship of business process assistant and functional organization ($r=0.394$, $\sigma=0.021 < 0.05$). This means that functional organizations tend to create business process assistant role during SOA transformation.

New Strategy and Governance Roles versus Initial Organization Structure

Table 126: Correlations: New Strategy and Governance Roles versus Initial Organization Structure

| Correlations | | | | |
|-------------------------|---------------------|------------------------------|------------------------------|--------------------------|
| | | Functional organization flag | Divisional organization flag | Matrix organization flag |
| SOA Strategy Manager | Pearson Correlation | -.199 | -.023 | .241 |
| | Sig. (2-tailed) | .260 | .895 | .170 |
| | N | 34 | 34 | 34 |
| SOA Governance Manager | Pearson Correlation | .167 | -.257 | .102 |
| | Sig. (2-tailed) | .346 | .143 | .565 |
| | N | 34 | 34 | 34 |
| SOA Process Manager | Pearson Correlation | .211 | -.212 | .004 |
| | Sig. (2-tailed) | .230 | .230 | .982 |
| | N | 34 | 34 | 34 |
| SOA Measurement Manager | Pearson Correlation | .077 | -.197 | .133 |
| | Sig. (2-tailed) | .665 | .265 | .452 |
| | N | 34 | 34 | 34 |
| SOA Security Manager | Pearson Correlation | -.072 | .048 | .024 |
| | Sig. (2-tailed) | .687 | .786 | .892 |
| | N | 34 | 34 | 34 |
| SOA Technology Scout | Pearson Correlation | -.119 | .134 | -.018 |
| | Sig. (2-tailed) | .501 | .449 | .917 |
| | N | 34 | 34 | 34 |

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between the new strategy and governance roles created within the organization and the initial structure of the organization. The result is that there is no strong relationship between the new strategy and governance roles created within the organization and the initial structure of the organization.

New Design and Quality Management Roles versus Initial Organization Structure

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between the new design and quality management roles created within the organization and the initial structure of the organization. Only strong correlation is the negative relationship of business process assistant and divisional organization ($r = -0.361$, $\sigma = 0.036 < 0.05$). This means that divisional organizations do not tend to create service designer role during SOA transformation.

Table 127: Correlations: New Design and Quality Management Roles versus Initial Organization Structure

| Correlations | | | | |
|-------------------------------------------------------------|---------------------|------------------------------|------------------------------|--------------------------|
| | | Functional organization flag | Divisional organization flag | Matrix organization flag |
| Business Process Architect | Pearson Correlation | .019 | -.112 | .103 |
| | Sig. (2-tailed) | .915 | .528 | .563 |
| | N | 34 | 34 | 34 |
| Business Process Orchestrator | Pearson Correlation | -.119 | -.151 | .296 |
| | Sig. (2-tailed) | .501 | .394 | .089 |
| | N | 34 | 34 | 34 |
| Service Designer | Pearson Correlation | .116 | -.361* | .272 |
| | Sig. (2-tailed) | .513 | .036 | .119 |
| | N | 34 | 34 | 34 |
| Business Process Integrator | Pearson Correlation | -.098 | -.052 | .164 |
| | Sig. (2-tailed) | .579 | .770 | .354 |
| | N | 34 | 34 | 34 |
| Business Process Tester | Pearson Correlation | .243 | -.080 | -.175 |
| | Sig. (2-tailed) | .167 | .655 | .321 |
| | N | 34 | 34 | 34 |
| Release Manager | Pearson Correlation | .147 | -.027 | -.130 |
| | Sig. (2-tailed) | .407 | .881 | .464 |
| | N | 34 | 34 | 34 |
| Service Librarian | Pearson Correlation | .233 | .048 | -.306 |
| | Sig. (2-tailed) | .185 | .786 | .079 |
| | N | 34 | 34 | 34 |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | |

New Development and Evolution Roles versus Initial Organization Structure

Table 128: Correlations: New Development and Evolution Roles versus Initial Organization Structure

| Correlations | | | | |
|---------------------|---------------------|------------------------------|------------------------------|--------------------------|
| | | Functional organization flag | Divisional organization flag | Matrix organization flag |
| SOA Project Manager | Pearson Correlation | .019 | -.271 | .278 |
| | Sig. (2-tailed) | .915 | .121 | .112 |
| | N | 34 | 34 | 34 |
| SOA Project Member | Pearson Correlation | -.115 | -.077 | .209 |
| | Sig. (2-tailed) | .518 | .667 | .236 |
| | N | 34 | 34 | 34 |

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between the new development and evolution roles created within the organization and the initial structure of the organization. The result is that there is no strong relationship between the new development and evolution roles created within the organization and the initial structure of the organization.

New Support Roles versus Extent of SOA Transformation

Table 129: Correlations: New Support Roles versus Extent of SOA Transformation

| Correlations | | | |
|------------------------------------|---------------------|-----------------------|-----------------------|
| | | Enterprise level flag | Divisional level flag |
| Business Process Support Assistant | Pearson Correlation | .041 | -.041 |
| | Sig. (2-tailed) | .817 | .817 |
| | N | 34 | 34 |
| Business Process Assistant | Pearson Correlation | -.298 | .298 |
| | Sig. (2-tailed) | .087 | .087 |
| | N | 34 | 34 |
| Business Process Manager | Pearson Correlation | .194 | -.194 |
| | Sig. (2-tailed) | .272 | .272 |
| | N | 34 | 34 |
| Service Developer | Pearson Correlation | .061 | -.061 |
| | Sig. (2-tailed) | .732 | .732 |
| | N | 34 | 34 |

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between the new support roles created within the organization and the extent of SOA transformation in the organization. The result is that there is no strong relationship between the new support roles created within the organization and the initial structure of the organization.

New Strategy and Governance Roles versus Extent of SOA Transformation

Table 130: Correlations: New Strategy and Governance Roles versus Extent of SOA Transformation

| Correlations | | | |
|-------------------------------------------------------------|---------------------|-----------------------|-----------------------|
| | | Enterprise level flag | Divisional level flag |
| SOA Strategy Manager | Pearson Correlation | .381* | -.381* |
| | Sig. (2-tailed) | .026 | .026 |
| | N | 34 | 34 |
| SOA Governance Manager | Pearson Correlation | .022 | -.022 |
| | Sig. (2-tailed) | .901 | .901 |
| | N | 34 | 34 |
| SOA Process Manager | Pearson Correlation | .108 | -.108 |
| | Sig. (2-tailed) | .543 | .543 |
| | N | 34 | 34 |
| SOA Measurement Manager | Pearson Correlation | -.094 | .094 |
| | Sig. (2-tailed) | .596 | .596 |
| | N | 34 | 34 |
| SOA Security Manager | Pearson Correlation | .041 | -.041 |
| | Sig. (2-tailed) | .817 | .817 |
| | N | 34 | 34 |
| SOA Technology Scout | Pearson Correlation | -.061 | .061 |
| | Sig. (2-tailed) | .732 | .732 |
| | N | 34 | 34 |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | |

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between the new strategy and governance management roles created within the organization and the extent of SOA transformation in the organization. There are 2 strong correlations. First one is the positive relationship between the SOA strategy manager and the enterprise level SOA transformations ($r=0.381$, $\sigma=0.026 < 0.05$) and the second is the negative relationship between SOA strategy manager and the

divisional level SOA transformations ($r=-0.381$, $\sigma=0.026 < 0.05$). These 2 correlations conclude that enterprise level SOA transformations tend to create the role SOA strategy manager, whereas divisional level SOA transformations are not much interested in this role.

New Design and Quality Management Roles versus Extent of SOA Transformation

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between the new design and quality management roles created within the organization and the extent of SOA transformation in the organization. The result is that there is no strong relationship between the new design and quality management roles created within the organization and the initial structure of the organization.

Table 131: Correlations: New Design and Quality Management Roles versus Extent of SOA Transformation

| Correlations | | | |
|-------------------------------|---------------------|-----------------------|-----------------------|
| | | Enterprise level flag | Divisional level flag |
| Business Process Architect | Pearson Correlation | .010 | -.010 |
| | Sig. (2-tailed) | .957 | .957 |
| | N | 34 | 34 |
| Business Process Orchestrator | Pearson Correlation | .235 | -.235 |
| | Sig. (2-tailed) | .180 | .180 |
| | N | 34 | 34 |
| Service Designer | Pearson Correlation | -.075 | .075 |
| | Sig. (2-tailed) | .673 | .673 |
| | N | 34 | 34 |
| Business Process Integrator | Pearson Correlation | .147 | -.147 |
| | Sig. (2-tailed) | .407 | .407 |
| | N | 34 | 34 |
| Business Process Tester | Pearson Correlation | .188 | -.188 |
| | Sig. (2-tailed) | .287 | .287 |
| | N | 34 | 34 |
| Release Manager | Pearson Correlation | .075 | -.075 |
| | Sig. (2-tailed) | .673 | .673 |
| | N | 34 | 34 |
| Service Librarian | Pearson Correlation | -.114 | .114 |
| | Sig. (2-tailed) | .520 | .520 |
| | N | 34 | 34 |

New Development and Evolution Roles versus Extent of SOA Transformation

Table 132: Correlations: New Development and Evolution Roles versus Extent of SOA Transformation

| Correlations | | | |
|---------------------|---------------------|-----------------------|-----------------------|
| | | Enterprise level flag | Divisional level flag |
| SOA Project Manager | Pearson Correlation | .010 | -.010 |
| | Sig. (2-tailed) | .957 | .957 |
| | N | 34 | 34 |
| SOA Project Member | Pearson Correlation | .298 | -.298 |
| | Sig. (2-tailed) | .087 | .087 |
| | N | 34 | 34 |

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between the new development and evolution roles created within the organization and the extent of SOA transformation in the organization. The result is that there is no strong relationship between the new development and evolution roles created within the organization and the initial structure of the organization.

Changes in the Organizational Structure versus Changes in the Organizational Structure

Table 133: Correlations: Changes in the Organizational Structure versus Changes in the Organizational Structure

| | | Correlations | | | | | |
|----------|---------------------|--------------|----------|----------|----------|----------|----------|
| | | Change 1 | Change 2 | Change 3 | Change 4 | Change 5 | Change 6 |
| Change 1 | Pearson Correlation | 1 | .214 | .023 | .015 | -.052 | .128 |
| | Sig. (2-tailed) | | .225 | .895 | .933 | .770 | .470 |
| | N | 34 | 34 | 34 | 34 | 34 | 34 |
| Change 2 | Pearson Correlation | .214 | 1 | -.095 | -.249 | .443** | -.198 |
| | Sig. (2-tailed) | .225 | | .594 | .155 | .009 | .262 |
| | N | 34 | 34 | 34 | 34 | 34 | 34 |
| Change 3 | Pearson Correlation | .023 | -.095 | 1 | .279 | .072 | .023 |
| | Sig. (2-tailed) | .895 | .594 | | .110 | .688 | .895 |
| | N | 34 | 34 | 34 | 34 | 34 | 34 |
| Change 4 | Pearson Correlation | .015 | -.249 | .279 | 1 | -.041 | .015 |
| | Sig. (2-tailed) | .933 | .155 | .110 | | .818 | .933 |
| | N | 34 | 34 | 34 | 34 | 34 | 34 |
| Change 5 | Pearson Correlation | -.052 | .443** | .072 | -.041 | 1 | .074 |
| | Sig. (2-tailed) | .770 | .009 | .688 | .818 | | .675 |
| | N | 34 | 34 | 34 | 34 | 34 | 34 |
| Change 6 | Pearson Correlation | .128 | -.198 | .023 | .015 | .074 | 1 |
| | Sig. (2-tailed) | .470 | .262 | .895 | .933 | .675 | |
| | N | 34 | 34 | 34 | 34 | 34 | 34 |

** . Correlation is significant at the 0.01 level (2-tailed).

Change 1 - Creation of project-oriented organization structure for the development of new distributed processes

Change 2 - Introduction of some cross-domain departments to be able to maintain the cross-department functionality

Change 3 - Foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities

Change 4 - Moving from hierarchical organizational structures to more horizontal structures

Change 5 - Improving the relationship between business units and IT

Change 6 - Creation of a new operating process in IT organization for service management

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between changes to organizational structure introduced during SOA transformation in the organization. Only strong correlation is the positive relationship between two changes, introduction of some cross-domain departments to be able to maintain the cross-department functionality and improving the relationship between business units and IT ($r=0.443$, $\sigma=0.009 < 0.05$). The relationship is statistically significant even at 1% level. The result is that the organizations which create cross-domain departments for cross-department functionality also tend to improve the relationship between business units and IT.

Changes in the Funding Model versus Changes in the Funding Model

Table 134: Correlations: Changes in the Funding Model versus Changes in the Funding Model

| Correlations | | | | | |
|-----------------|---------------------|-----------------|-----------------|-----------------|-----------------|
| | | Funding Model 1 | Funding Model 2 | Funding Model 3 | Funding Model 4 |
| Funding Model 1 | Pearson Correlation | 1 | -.407* | -.281 | -.227 |
| | Sig. (2-tailed) | | .017 | .107 | .196 |
| | N | 34 | 34 | 34 | 34 |
| Funding Model 2 | Pearson Correlation | -.407* | 1 | .133 | -.012 |
| | Sig. (2-tailed) | .017 | | .452 | .946 |
| | N | 34 | 34 | 34 | 34 |
| Funding Model 3 | Pearson Correlation | -.281 | .133 | 1 | -.091 |
| | Sig. (2-tailed) | .107 | .452 | | .608 |
| | N | 34 | 34 | 34 | 34 |
| Funding Model 4 | Pearson Correlation | -.227 | -.012 | -.091 | 1 |
| | Sig. (2-tailed) | .196 | .946 | .608 | |
| | N | 34 | 34 | 34 | 34 |

*. Correlation is significant at the 0.05 level (2-tailed).
 Funding Model 1 - Central funding, a pool of resources created within the organization to fund the new services
 Funding Model 2 - The first consumer or the first application which needs the service pays for the implementation
 Funding Model 3 - All consumers of the service should pay for the development
 Funding Model 4 - Provider handles the development costs and charges the consumers of the services based on the consumption rate

This analysis is performed to be able to find out whether there is a positive or negative strong relationship between new funding models introduced during SOA transformation in the organization. Only strong correlation is the negative relationship between two funding models, central funding where a pool of resources created within the organization to fund the new services and the first consumer or the first application which needs the service pays for the implementation ($r=-0.407$, $\sigma=0.017 < 0.05$).

The result is that the organizations do not prefer to use central funding for the new services when they introduced the model which requires the first consumer or application to fund the implementation of the new service.

New Roles Created versus New Roles Created

Table 135: Correlations: New Roles Created versus New Roles Created

| Role 1 | Role 2 | Sigma | r | Analysis |
|------------------------------------|-----------------------------|-------|--------|-------------------------------------------------------------------------------------------------------------|
| Business Process Manager | Business Process Tester | 0.009 | 0.443 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| Business Process Manager | SOA Project Manager | 0.002 | 0.504 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| Business Process Manager | SOA Project Member | 0.009 | 0.440 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| Service Developer | SOA Project Manager | 0.005 | 0.471 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| SOA Strategy Manager | Business Process Architect | 0.001 | 0.548 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| Service Developer | SOA Project Member | 0.003 | 0.491 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| Business Process Architect | Service Designer | 0.002 | 0.504 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| Business Process Tester | SOA Project Member | 0.008 | 0.446 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| Release Manager | Service Librarian | 0.000 | 0.736 | <ul style="list-style-type: none"> ▪ Significant at 1% level ▪ Positive correlation |
| Business Process Support Assistant | Business Process Integrator | 0.025 | -0.384 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Negative correlation |
| Business Process Support Assistant | Release Manager | 0.041 | -0.352 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Negative correlation |
| Business Process Assistant | SOA Governance Manager | 0.032 | 0.369 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |

Table 135: Continued.

| Role 1 | Role 2 | Sigma | r | Analysis |
|-------------------------------|-------------------------------|-------|-------|-------------------------------------------------------------------------------------------------------------|
| Business Process Assistant | SOA Measurement Manager | 0.014 | 0.417 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| Business Process Assistant | Service Librarian | 0.040 | 0.354 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| Business Process Manager | SOA Process Manager | 0.036 | 0.361 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| Business Process Manager | Business Process Architect | 0.049 | 0.340 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| Business Process Manager | Business Process Orchestrator | 0.025 | 0.384 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| SOA Governance Manager | Service Designer | 0.019 | 0.400 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| SOA Process Manager | SOA Security Manager | 0.012 | 0.427 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| SOA Process Manager | SOA Project Manager | 0.016 | 0.411 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| Business Process Architect | SOA Project Manager | 0.022 | 0.393 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| Business Process Architect | SOA Project Member | 0.013 | 0.422 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| Business Process Orchestrator | Business Process Integrator | 0.016 | 0.410 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |
| Service Designer | SOA Project Manager | 0.049 | 0.340 | <ul style="list-style-type: none"> ▪ Significant at 5% level ▪ Positive correlation |

Regression Analysis

3 different regression analyses have been performed. In all 3 analyses, success of the SOA transformation is the dependent variable. Independent variables are variables in each of the 3 dimensions used in the overall analysis.

Following diagram presents the regression test results for the variables of second dimension (except the success of the SOA transformation) as independent variables and the success of the SOA transformation as the dependent variable.

Table 136: Regression: Dimension 2 as Independent Variable and Success of the SOA Transformation as the Dependent Variable

| Model Summary ^b | | | | | | | | | |
|----------------------------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .583 ^a | .340 | .092 | .861 | .340 | 1.373 | 9 | 24 | .254 |

a. Predictors: (Constant), What kind of organizational structure have your organization had when you started SOA Transformation, Lowering IT Operating Costs, Fostering software (service) reuse, Better integration of processes/information with customers/suppliers, Increasing revenue, Improving quality of IT systems, Enhancing internal operational process efficiency and flexibility, Supporting ever-changing business environment to become more agile, What is/was the extent of SOA in your organization

b. Dependent Variable: How successful have your SOA projects been

“R Square” value which is the coefficient of determination is 0.340; this means about 34.0% of the success in SOA transformation is explained variables of dimension 2. For this reason the regression equation does not seem to be useful for making predictions since the value of “R Square” is far from being 1.

Following diagram presents the regression test results for the variables of dimension 3 as independent variables and the success of the SOA transformation as the dependent variable.

Table 137: Regression: Dimension 3 as Independent Variable and Success of the SOA Transformation as the Dependent Variable

| Model Summary ^b | | | | | | | | | |
|----------------------------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .930 ^a | .864 | -.121 | .957 | .864 | .877 | 29 | 4 | .643 |

a. Predictors: (Constant), SOA Project Member, SOA Process Manager, Business Process Assistant, SOA Technology Scout, Creation of a new operating process in IT organization for service management, Improving the relationship between business units and IT, Release Manager, Moving from hierarchical organizational structures to more horizontal structures, Business Process Integrator, The first consumer or the first application which needs the service pays for the implementation, All consumers of the service should pay for the development, Service Designer, Provider handles the development costs and charges the consumers of the services based on the consumption rate, SOA Security Manager, Foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities, Service Developer, SOA Strategy Manager, Business Process Tester, Introduction of some cross-domain departments to be able to maintain the cross-department functionality, Business Process Manager, Creation of project-oriented organization structure for the development of new distributed processes, SOA Governance Manager, SOA Measurement Manager, SOA Project Manager, Business Process Architect, Service Librarian, Business Process Support Assistant, Central funding - A pool of resources created within the organization to fund the new services, Business Process Orchestrator

b. Dependent Variable: How successful have your SOA projects been

“R Square” value which is the coefficient of determination is 0.864; this means about 86.4% of the success in SOA transformation is explained variables of dimension 1. For this reason the regression equation appears to be useful for making predictions since the value of “R Square” is close to 1. However when the sigma values is checked

(sigma=0.643), it can be concluded that the collection of variables of dimension 3 is not useful as a predictor of the success of the SOA transformation.

Following diagram presents the regression test results for the variables of dimension 4 as independent variables and the success of the SOA transformation as the dependent variable.

Table 138: Regression: Dimension 4 as Independent Variable and Success of the SOA Transformation as the Dependent Variable

| Model Summary ^b | | | | | | | | | |
|----------------------------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .445 ^a | .198 | .087 | .863 | .198 | 1.789 | 4 | 29 | .158 |

a. Predictors: (Constant), Organizational Structure, Management buy-in, IT Staffing , Collaboration

b. Dependent Variable: How successful have your SOA projects been

The coefficient of determination is 0.198; this means about 19.8% of the success in SOA transformation is explained variables of dimension 4. For this reason the regression equation does not seem to be useful for making predictions since the value of “R Square” is far from being 1.

CHAPTER 5

CONCLUSION

Nowadays, SOA is one of the most discussed words in technology and business world. SOA promises a new way of designing and implementing software components to make it possible to plug-and-play new components like adding a new Lego to a child's model. Being so appealing, SOA adoption started to become the highest priority in the to-do list of many organizations which are keen on creating systems that can easily and quickly be configured and modified to support dynamically changing business requirements. However, SOA is more than being just a technology change and has impacts on corporate governance model, in particular organizational structures, IT investment and funding models, people and roles and operational activities and requires collaboration and management support.

First of all, existing formal organizational structures are lacking to support the requirements of SOA in terms of flexibility and agility. This requires organizations to introduce changes in the organizational structure for a successful SOA adoption and to ensure the effort made for SOA will not become worthless. During the study, what is found is that the changes introduced do not have a relationship with the existing structures, which means organizations try to find the best set of changes that will provide them the benefits of SOA and competitive advantage. The most common change done by the organizations is to improve the relationship between business and IT which is followed by creation of new service management procedures and project oriented structure to enable development of distributed processes. Several organizations decided to found SOA Center of Excellence or Integration Competence Center to centralize SOA

activities and some of them introduced cross-domain departments for cross-department functionality. Few companies moved from hierarchical organizational structures to more horizontal structures during their SOA transformation.

Secondly, in traditional architectures budgets are allocated in silos at the project, group, or department level which is against the main requirements of SOA which enforces sharing capabilities as services and reusing existing assets. During the research, it has been understood that organizations do improve their funding models for SOA adoption mainly by introducing central funding of services where a pool of resources created within the organization to fund the new services or requiring the first consumer or the first application which needs the service to pay for the implementation.

Moreover, organizations are striving to find people experienced in both technology and business domains to ensure the proper design and implementation of the SOA projects. This effort introduced plenty of new roles and responsibilities within the organizations mainly in support, strategy and governance, design and development domains. Some of the new roles are highly in demand and considered as critical by organizations like Business Process Architect, SOA Project Manager, Service Developer and SOA Project Member. However, roles like SOA Measurement Manager, SOA Security Manager and Service Librarian are not so popular within the organizations at the moment.

Furthermore, organizations are encouraged to change their approach to operational activities in order to accommodate the new integration and process management model. The biggest impact is in IT team and business process management. Both teams should be trained to have a more horizontal vision to be able to support end to end business processes. Also, improvements are necessary to testing and deployment

procedures and there is a need to reorganize SLA definitions and related monitoring/assurance.

What is more, SOA transformation definitely requires collaboration from the very beginning, the initial ideas, to the end, operations and maintenance. However collaboration might be difficult to achieve especially in organizations in which there are isolated departments each of them acting on its goodness. Moreover, executive-level buy-in is also very important as without management buy-in, it is very difficult to put in place a SOA solution within the enterprise with full potential.

Taking everything into consideration, for managers who would like to start SOA transformation in their companies, it can be concluded that SOA is a big step towards highly flexible and agile business environment, however it is not a silver bullet which can change everything in the organization in a moment and requires collaboration between different units of the organizations commitment from all the organization including business, IT and senior management. It is a huge change which requires long term planning at the very beginning to ensure the success of the transformation, otherwise it can become a disaster. The recommendation would be starting with small pilot project(s) and then expanding the scope of the projects to a division or the whole enterprise based on the needs of the organization. This expansion should be considered as a chance to re-design the organization to take full power of the SOA transformation to make the organization much more focused, efficient, and flexible.

As per limitations, one of the most challenging parts of this study was to find the professionals who have hands on experience in SOA transformations. SOA is a pretty new architecture and not many organizations started this transformation in Turkey and as well in the world. For this reason, there were difficulties to find enough resources

during literature review. Moreover, initially organizations mostly consider SOA transformation as just technology change and focus on technology perspective disregarding the changes required in the organizational structure. This is reflected also in the resources like articles, books and such alike which resulted in the documents referenced to be mostly from 2008 and 2009. For future research, it would be interesting to include a larger number of respondents to improve the results of analysis. This will also make it possible to perform analysis based on the sector of the organization which was not possible in this study as most of the respondents were from telecommunications sector.

APPENDIX A: Survey

ORGANIZATIONAL CHANGES AND SOA TRANSFORMATION

Welcome to our survey and thank you very much for your participation. Your opinions are important for us. This survey has been created by Ihsan Birekul, M.A candidate in Management Information Systems Department at Bogazici University, Istanbul, TURKEY for his graduate thesis.

As only a summary of the results will be used for the study, your individual responses will be kept fully anonymous and confidential. Your honest comments are greatly appreciated.

The objective of this research study is to find out what kind of organizational changes are required during SOA (Service Oriented Architecture) transformation and how it is related with the success of the new architecture. Intended audience of this study is the professionals who have hands on experience in at least one SOA project. Please reply to this survey if you have been in any SOA Project and please answer the questions referring to a single SOA Project/Transformation if you have been in more than one.

To start the survey, please proceed to page 2.

Ihsan Birekul

M.A Candidate in Bogazici University

Istanbul, TURKEY

1. Demographics

- a. Title:
- b. Sector:
- c. SOA Experience (in years):
- d. Region (Country and/or City):

2. What is/was the extent of SOA in your organization?

- Enterprise level
- Departmental/divisional level
- Single, isolated projects

3. At what stage your SOA is:

- In Pilot (Currently evaluating)
- In development
- Deployed in a single department
- Deployed in multiple departments
- Deployed for external use
- Other (please specify)

**4. Based on your experience, what are the reasons for SOA transformation?
(Please select all applicable changes from the list below)**

- Supporting ever-changing business environment to become more agile
- Enhancing internal operational process efficiency and flexibility
- Improving quality of IT systems
- Increasing revenue
- Better integration of processes/information with customers/suppliers
- Fostering software (service) reuse
- Lowering IT Operating Costs
- Other (please specify):

5. How successful have your SOA projects been?

- Far more successful than expected
- More successful than expected
- As expected
- Less successful than expected
- Far less successful than expected
- Not yet deployed to production environments

6. What kind of organizational structure have your organization had when you started SOA Transformation?

- Functional Organization
- Divisional Organization (based on products or product lines)
- Divisional Organization (based on geography)
- Divisional Organization (based on market)
- Matrix Organization
- Other (please specify):

7. Did you apply any changes to structure of the organization during or after the SOA Transformation? If yes, please select all applicable changes from the list below.

- Creation of project-oriented organization structure for the development of new distributed processes
- Introduction of some cross-domain departments to be able to maintain the cross-department functionality
- Foundation of SOA Center of Excellence, Integration Competence Center or similar to centralize SOA activities
- Moving from hierarchical organizational structures to more horizontal structures
- Improving the relationship between business units and IT
- Creation of a new operating process in IT organization for service management
- Other (please specify):

8. Were there any changes made in the investment and/or funding model? If yes, please select all applicable changes from the list below.

- Central funding - A pool of resources created within the organization to fund the new services
- The first consumer or the first application which needs the service pays for the implementation
- All consumers of the service should pay for the development
- Provider handles the development costs and charges the consumers of the services based on the consumption rate
- Other (please specify):

9. Based on your experience, what kind of new roles needs to be created within the organization for SOA Transformation? (Select all that applies)

a. SOA Support Roles

- Business Process Support Assistant
- Business Process Assistant
- Business Process Manager
- Service Developer

b. SOA Strategy and Governance Roles

- SOA Strategy Manager
- SOA Governance Manager
- SOA Process Manager
- SOA Measurement Manager
- SOA Security Manager
- SOA Technology Scout

c. SOA Design and Quality Management Roles

- Business Process Architect
- Business Process Orchestrator
- Service Designer
- Business Process Integrator
- Business Process Tester
- Release Manager
- Service Librarian

d. SOA Development and Evolution Roles

- SOA Project Manager
- SOA Project Member
- Other (please specify):

**10. Do you think organizations needs to make changes to operational activities?
If yes, please specify.**

.....

**11. To what extent following changes impacted the success of the SOA
Transformation? (1 – Very Low Impact, 5 – Very High Impact)**

| | 1 | 2 | 3 | 4 | 5 |
|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Collaboration | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Management buy-in | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| IT Staffing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Organizational Structure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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