

## The Organizational Impacts of a Service Oriented Architecture

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### Abstract

The objective of this study is to identify organizational impacts in terms of roles and responsibilities in the transition from information systems to a distributed SERVICE ORIENTED ARCHITECTURE (SOA). Little research has focused on these impacts. The present research is based on two case studies, the first on a financial organization and the second on education. We collected the different attributes in these two organizations and we compared the results with the literature based on the model established by researchers. This model is built around SOA governance from an enterprise architecture perspective. The results of this research show that the roles and responsibilities identified within the financial organization closely reflect the work of the literature. On the other hand, within the educational organization, the roles and responsibilities correspond only in part to what the researchers propose in their model. We identified basic roles and responsibilities in the two organizations. Roles have been assigned to those who already have responsibilities in the organization. We deduced that there are three factors influencing the governance of roles and responsibilities: type of organization, management style, and corporate culture.

**Keywords:** SOA, governance, service oriented architecture organization, management style, culture

### 1. Introduction

Today, organizations are faced with rapid changes in market conditions and increased regulation. The SOA (SERVICE ORIENTED ARCHITECTURE) paradigm addresses these challenges by providing an architecture for information technology (IT) infrastructure to address the complexity and heterogeneity of systems. The SOA architecture does not impact existing technology infrastructures or applications. This new concept makes it possible to convert existing applications into services. IT architectures are built in order to support business processes and respond quickly to changes in business models. Companies are putting a lot of energy into implementing SOA to save money and respond to rapid market changes. Organizational aspects (roles and responsibilities) are important and are often not taken into consideration. The new roles of IT professionals and managers must adapt to this new way of functioning, otherwise the expected benefits will not be fully realized.

The SOA architecture allows the organization to transition from an application-centric vision to a process-centric view. With service-oriented architecture, now the organization has the ability to combine services from multiple applications to provide true business process support. It can improve or modify services without compromise, using integration mechanisms such as Web services. The most important aspect of this architecture is the separation between the implementation of the services and their interfaces. In other words, it separates the "What" from the "How". The major challenge facing organizations is the organizational impacts of the new architecture. Consequently, this research was carried out in the field to determine the new roles and responsibilities and the changes made to the IT function following the transition to a distributed SOA architecture and to validate them with the literature as proposed by [1].

## **2. Governance**

SOA governance is intended to be a catalyst for improving IT governance especially in large organizations dependent on aging infrastructure. Migration to the distributed architecture approach presents challenges for organizations in terms of governance of roles and responsibilities. The potential of this architecture may not be realized as additional challenges must be considered as the people, processes, and technologies that must be addressed through efficient governance. Without good governance, business agility is not systematic.

[2] defines corporate governance, IT and SOA as follows: good governance involves transparency and assurance that everyone involved understands their own roles and responsibilities. The question: what are the expectations of other team members and how do they contribute to the company's goals? Governance is defined as the set of rules, practices, roles, decisions, responsibilities and formal or informal agreements that control, how the work should be done. Each activity is defined as follows:

- What needs to be done?
- How should it be done?
- Who should do it?
- How should it be measured?

SOA governance enhances IT governance while focusing on adoption and direction of services. SOA provides a distinct approach at the enterprise level to conceptualize and deliver functional and cross-functional initiatives. To achieve the goals set, business strategists and IT people must work together to align business strategies with IT objectives.

## **3. SOA Dimension**

A study by [3] among 80 German companies shows that academics and practitioners have paid much more attention to the technical aspect than to the organizational aspect. Little literature covers this area of research. These same authors mention that "Organization and Governance" was studied by only 4 of the 175 research articles and only 20% of these companies benefited from the introduction of this architecture.

Researchers Lundkvist and Persson [4] report that IT governance has always been seen as a critical success factor for several years. They define IT governance as the process of "specification of roles, and responsibilities to encourage desirable behaviors of IT use". The importance and criticality of

implementing SOA governance to realize the expected benefits are reflected in the basic questions of their research:

- "What are the roles of each of the stakeholders?"
- How were responsibilities assigned to ensure management effectiveness and use of IT?

According to the same authors, many companies face these challenges and need to develop mechanisms for adequate governance of SOA because this architectural style introduces new complexities due to the large number of services to be managed and maintained, the need for changes in roles and responsibilities. Ultimately, technology alone is not enough. This architectural style does not impact technological infrastructures (servers, databases, heterogeneous and obsolete applications), but generates organizational impacts.

Hustad and de Lange [5] mention in their study that the implementation of SOA requires a long-term project involving an understanding of organizational changes in terms of new systems development approaches and the different mechanisms of IT governance, as well as changes in the roles and responsibilities of employees and system developers. This architecture should be used as a business transformation tool to solve requirements rather than a strict IT architecture initiative, SOA research is mostly technology-oriented, and the authors mentioned above have noticed an increase interest in the approach to governance and the development of several models by academics and practitioners. However, very few empirical and exploratory studies have focused on this area.

#### **4. Methodology**

For our research to be more credible and representative, we opted for case studies of two organizations. The first is a private organization operating in the banking sector that we have called Organization X. The second organization operates in the Para public educational field Organization Y: two sectors of activity completely different in context, management style and culture.

**Organization X:** This sector has many heterogeneous systems that are very complex to change or to migrate to other platforms and especially to integrate them. Deregulation and profit shrinking more and more as the growth of online banking affects the global financial market and requires increasing organizational agility. Traditional banking restrictions have fragmented IT infrastructure in the industry, and these have to be adapted to meet new customer demands. Thus, the ability to acquire new information technologies becomes a critical factor of competitiveness to support the financial business processes. Older architectures complicate the integration of enterprise applications because of the underlying elements created in closed and monolithic architectures. The applications used by the bank have been developed on several heterogeneous platforms. This hampers the banks' ability to offer new integrated financial products to consolidate redundancy and remain competitive.

The Y organization has a large number of disparate information systems with a variety of information technologies and all kinds of software and platforms. With austerity and budget cuts, the SOA solution to information technology has its place in reusing existing information technology and systems. The many solutions deployed for several years become difficult to list. Many applications have been developed internally, most are outdated and difficult to convert.

The problem faced by this institution's information technology concerns the heterogeneity of the information systems and technological infrastructures that have been set up to meet the academic (teaching and research) and administrative requirements. Replacing or migrating these systems is difficult and requires a lot of investment. As a result, a distributed architecture will expose applications to services and communicate them, and thus integrate services. This architecture is and the combination of services from multiple applications can offer quality services.

The choice of organization X and Y was made according to these criteria:

- Sources of information, such as interviews, qualitative data, etc. are placed at our disposal.
- The organization has already deployed SOA.
- Information is available.
- A large number of heterogeneous software, solutions and systems.
- The choice of a distributed architecture is an alternative.
- Very strong competition.

## **5. The Two Cases**

We selected two cases in two distinct organizations; this choice is motivated by the difference in IT management mode, organizational culture and competitive advantage. Competitiveness within the market is very great for a financial institution rather than for an educational institution.

## **6. Data Collection**

Semi-structured interviews and questionnaires were developed as tools for data collection. The combination of these two instruments allowed us to correlate these data in order to consolidate them and ensure their quality.

Data collection was carried out within the two organizations with the collaboration of the respective IT managers, business architects, project managers and infrastructure analysts involved in the adoption process. The duration of the interviews was on average two hours per stakeholder. During the interview, notes were made to reference the information collected.

We chose the exploratory approach, as this process is adequate for well-known and poorly documented phenomena that we wanted to describe in more detail [6]. This approach attempted to determine HOW and WHO. This research has enabled us to provide a more detailed picture of the observed phenomenon. The method used in this research is qualitative, as it focuses on non-numerical data. As this research is based on changing roles and responsibilities when adopting SOA, it seems to us justifiable and sensible to use this method.

## **7. Results**

Respondents informed us of the assignment of new roles and responsibilities that have been assigned within their respective organizations following the adoption of SOA. We have identified roles and responsibilities that are presented in the article while we have collected other roles that do not exist in the literature; they are detailed in the following table:

	Responsibilities	
Roles	Organization X	Organization Y
<b>SOA Manager</b>	<ul style="list-style-type: none"> <li>• Development of the business strategy</li> <li>• Organizational Transformation</li> <li>• Management of complex programs</li> <li>• Strategy and quality control</li> </ul>	<ul style="list-style-type: none"> <li>• IT / IS management within the institution</li> <li>• Member of the leadership team, responsible for promoting the development strategy and implementation of IT.</li> <li>• Responsible for the definition of technological orientations. Ensures that infrastructure, service applications and capabilities are available to meet current and future requirements.</li> <li>• Develops, manages and anticipates the capabilities required for business needs</li> <li>• Develops the corporate architecture roadmap and is responsible for making it evolve.</li> <li>• Defines and revises IT policies, procedures and standards and provides guidance for the establishment and implementation of key policies and practices.</li> <li>• Participates in the prioritization of projects as well as the preparation of operating budgets.</li> </ul>
<b>SOA Architect</b>	<ul style="list-style-type: none"> <li>• Designed standards based on the American Institute of Architects (AIA)</li> <li>• Uses Enterprise Object (EBO) templates</li> <li>• Integration of projects and service limits using ESB (Enterprise Service Bus)</li> </ul>	<ul style="list-style-type: none"> <li>• Analysis and collection of business needs</li> <li>• Technical and functional analyst</li> <li>• Technology Assessment and Recommendation</li> <li>• Systems Integration</li> </ul>
<b>SOA Analyst</b>	<ul style="list-style-type: none"> <li>• Models data structures (business processes)</li> <li>• Writes and executes service tests</li> <li>• Produces assessments and estimates</li> </ul>	<ul style="list-style-type: none"> <li>• Established project plans in accordance with the project management methodology that was defined and the protocols for change management</li> <li>• This responsibility rests with the application analyst.</li> </ul>
<b>SAO Applications Analyst</b>	<p>Writing of business requirements documents and system specifications</p> <ul style="list-style-type: none"> <li>• Communicates directly with customers</li> <li>• Manages the strategy of relationship and negotiation with customers</li> </ul>	<p>Design and architecture</p> <p>Development, implementation support and solution integration with EAI tools.</p>
<b>SOA Developer</b>	<ul style="list-style-type: none"> <li>• Development and integration of new services</li> <li>• Use of ESB, SOAP and UI tools for publishing services</li> </ul>	<ul style="list-style-type: none"> <li>• Design and architecture</li> <li>• Development, implementation support and solution integration with EAI tools</li> </ul>

	Responsibilities	
Roles	Organization X	Organization Y
<b>SOA Solutions Architect</b>	<p>Specification and design of architectures and collaboration with the project team.</p> <ul style="list-style-type: none"> <li>• Responsible for the architecture and reorientation of project to face the problems of architecture</li> <li>• Responsible for and managed the SOA development team</li> <li>• Member of the IT / SOA Governance Committee.</li> </ul>	
<b>SOA Data Architect</b>	<ul style="list-style-type: none"> <li>• Definition of standards and practices, automation of procedures. Advise and validate data from most SOA projects.</li> <li>• Analysis and design of the architecture, migration, integration and data modeling</li> <li>• Data protection and security</li> <li>• Data Quality Management</li> </ul>	
<b>SOA Infra-structure Analyst</b>	<ul style="list-style-type: none"> <li>• Support for the SAO infrastructure</li> <li>• Upgrade hardware and software infrastructures</li> <li>• Presentation of technology architectures to developers</li> <li>• Deployment of security tools and high availability of equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Design and architecture</li> <li>• Development, implementation support and solution integration with EAI</li> </ul>
<b>SOA Support Analyst</b>	<p>Responsible for the support team</p> <ul style="list-style-type: none"> <li>• Discusses with developers about service issues</li> <li>• Manages Help Desk and assigns tickets to technicians</li> </ul>	
<b>SOA Chief Project</b>	<ul style="list-style-type: none"> <li>• Project Manager and Project and Security Governance Office</li> <li>• Daily management of multidisciplinary teams (analysts, developers and architects) in the SOA department.</li> <li>• Development of web services related to Back-End systems to Front-End applications.</li> <li>• Management of teams, stakeholders, risk plans and budgets. Integration between projects and shared services</li> </ul>	<ul style="list-style-type: none"> <li>• Management of project teams and head of the project office</li> <li>• Needs analysis and development of SOA solutions</li> <li>• Technology selection and orientation</li> <li>• Coordination of installation, testing and computer security work</li> <li>• Negotiation and monitoring of acquisition contracts</li> <li>• Licensing</li> <li>• Preparation of procedural guides and other management tools</li> </ul>

	Responsibilities	
Roles	Organization X	Organization Y
<b>SOA Project Manager</b>	Management of project teams and head of the project office <ul style="list-style-type: none"> <li>• Needs analysis and development of SOA solutions</li> <li>• Technology selection and orientation</li> <li>• Coordination of installation, testing and computer security work</li> <li>• Negotiation and monitoring of acquisition contracts</li> <li>• Licensing</li> <li>• Preparation of procedural guides and other management tools</li> </ul>	
<b>SOA Business Process Developer</b>	<ul style="list-style-type: none"> <li>• Automation of business processes (using workflows)</li> <li>• Data protection and security</li> <li>• Data Quality Management</li> <li>• Integration of different functions and systems to secure data and ensure integrity and reliability</li> <li>• Standardization of operations</li> </ul>	
<b>SOA Technology Prospector</b>	<ul style="list-style-type: none"> <li>• Data protection and security</li> <li>• Data Quality Management</li> <li>• Integration of different functions and systems to secure data and ensure integrity and reliability</li> <li>• Standardization of operations</li> </ul>	

Table 1: Roles and Responsibilities for SOA

## 8. Conclusion

In the context of this research, we found that there is very little literature on the organizational impact of SOA adoption on IT governance in terms of roles and responsibilities. On the other hand, the themes covering the technical field are abundant. In fact, there are no systematic models that we could apply to redefine and / or assign roles and responsibilities in a transition to a distributed architecture. The few models deserve consideration in order to plan an efficient adoption of SOA and realize the expected benefits. We found that corporate culture greatly influences adoption because of fear of change or lack of technological maturity. We conclude that the transition to SOA requires building an organization-specific model while drawing on existing models and best practices to ensure transition and governance in a transparent and efficient manner.

The roles and responsibilities are fundamental in IT management and can be compared with the construction of a house where, whatever the nature of the project, there are basic roles and

responsibilities such as an architect, bricklayer, plumber, electrician, etc. The design of the interior of a house that is optional depends on the choice of the owner. When compared with SOA, some roles exist and are not cited in the literature but are found within organizations, probably due to managerial style, budget availability, austerity policy, new regulations, etc.

We have identified roles that exist in the literature and others specific to the organization. There are basic roles found in the two organizations, which are six in number, while other roles have been assigned to those already having responsibilities in the organization. We conclude that there are three factors influencing the governance of roles and responsibilities:

- Type of organization,
- Management style,
- Organizational culture.

The literature defines SOA adoption from an enterprise architecture perspective and proposes three macro-processes (SOA governance, SOA management and SOA technology prospecting) cited above assigned to the company's architect and the IT Manager; these two managers are responsible for assigning roles to stakeholders. In both organizations, SOA adoption is governed from an IT perspective. Roles and responsibilities are assigned by the IT Manager.

We studied only two organizations. However, within these organizations we had sufficient data. It would be interesting in the future to study more organizations, in order to ensure better visibility and representativeness. It would be interesting also for future research to answer the many remaining questions on this architecture. Further research is needed.

## 9. References

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