SOA, Its Need and Testing
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ABSTRACT
A Service Oriented Architecture (SOA) is a way of designing a software system and its surrounding environment to provide services either to various applications, to executable business processes or to other services through published and discoverable service interfaces. SOA is a new paradigm that supports modularized implementation of Services [1]. This architecture is particularly applicable when multiple applications running on varied technologies and platforms have to communicate with each other. Transformation to Software Oriented Architecture is required to meet the various aspects like obtaining software free from defects, within schedule and within budget [2]. The complexity of a service-oriented architecture can complicate testing and make choosing and implementing the right testing tools more difficult. Few top challenges involved in SOA testing are: real time applications; no user interface for the services; conceptualizing test bed close to the end user environment; infinite consumers possible (thick client, thin client etc.); infinite user population; multi-skilled test teams: domain, technology and testing knowledge [3]. Some of the top risks involved are: functionality, performance, backward compatibility, interoperability, compliance, security. The first thing you need to do when you start figuring what to test for your SOA is to develop (or start developing) your test strategy. If you’re testing a SOA you need to understand the implementation model and technologies involved, because these typically combine to give you some common features of a SOA. Various testing methodologies are being studied and implemented which enables to implement SOA with ease [4]. Many organizations are implementing SOA parallel with the existing architecture which finally leads to complex structure in the development of a system. So a solution to this problem is provided in this paper stating that SOA must be implemented from the very beginning of the software development process so that system can be developed with maximum reusability, minimum redundancy, minimum complexity, and within budget.

KEYWORDS
SOA: Service Oriented Architecture
SDLC: System Development Life Cycle

1. INTRODUCTION
We have progressed from modules, to objects, to components, and now to services. Business would like IT organizations to be more agile, but don’t want to pay more. And IT Organizations need resources in order to keep legacy applications running well, develop more agile and productive infrastructure, and needed business capabilities. And if an organization works such that same kinds of work need to be done in different department, it will result in developing different systems performing almost similar tasks. Hence it is wastage of time, cost and workers. These constraints of an organization can be highly reduced by implementing SOA. SOA act as a bridge between Business model and Technology model. SOA helps enhancing reusability. Modification and maintenance of services now has become easier and meets the expectations of clients or customers. Though implementing SOA in an organization simplifies the work by multiple folds, but does the organization is able to implement it as it is expected. The theoretical concepts of SOA and how long and how effectively it is being implemented by an organization differs. Most of the organizations are running SOA and other architectures parallel. Implementing the services at different platforms is still found to be difficult by the workers of the organization.

2. WHAT SOA PROMISES TO PROVIDE?
We have progressed from modules, to objects, to components, and now to services. Adopting SOA in organizations reduces redundancy and enhances reusability. One of the promises of adopting a service oriented approach in organizations is the potential cost saving that result from the reuse of existing services [5].

Business wants system to be more agile but don’t want to pay more. So to meet the need of the business organization without hampering the IT organization, SOA serves as a bridge (fig. 1).
In a nutshell, SOA enables organization to formulate integrated systems with less effort minimum redundancy. SOA provides granularity, hence increasing flexibility), separation of concerns, loose coupling and standard based technologies [6].

2.1. CHALLENGES INVOLVED IN SOA

In this article, SOA is observed in a very basic level where implementation needs a clear path for successful SOA in an organization. Though there are various challenges that are involved in SOA implementation. The top challenges and risks involved can be as listed below:

- Security
- Performance
- What functionality it performs
- Infinite number of users to one service.
- Mostly services don’t provide user interface [3].

2.2. SECURITY ASPECTS IN SOA

Data/ information are critically important in every business. Services should be implemented in the organization, such that data of the organization is kept safe, secure. Enterprise providing the application (using SOA) must ensure at a high degree the security of business information [7]. Any system is as secure as its weakest link. This should be kept in mind by the developers of the organization who are developing the application. Insecurity of data/ information increases when the services are being produced by outsourced providers.

2.3. EFFICIENCY ACHIEVED BY SOA

Theoretical concepts of SOA and how effectively and the depth up to which SOA is being implemented by an organization differs. Most of the SOA implementation ends up failing to failing to meet the enterprise expectations of an implementation. The SOA implementation devolves into an unmanageable mess of services with no foresight into control. Instead of minimizing redundancy it involves much of redundancy into it, and reusability concept is also lost. In SOA, applications need not to be build from scratch, the services are reused. Instead of writing new application from very beginning, the developers need to align the services with business capability. Import existing services and implement it with new application [7].

3. HOW MANAGED AND WELL IMPLEMENTED IS YOUR SOA?

Is SOA meeting the long term goals in your organization?

Need of the organization: An IT organization want to serve their clients (or customers) in the most effective way in minimum cost and time available in order to distinguish themselves from their competitors. They have to provide service to the customers in a way that their product don’t get thrown out of the market and also the customer is satisfied to the fullest. Also if the customer needs something better or different, the organization should be able to replace the services with another without much effort and time. That means the services generated must have enough flexibility to accommodate the required change.

Solution provided by SOA: the SOA basically provides services that are so granular that it is flexible enough to accommodate the required change, provided it is implemented properly in your organization. During the mid 2000s, SOA practice was introduced and since then a majority of IT sectors have started to implement SOA. But still there are many organizations which are not able to apply SOA practices to their applications effectively. Most of the organizations are implementing SOA distinctly and other architectures distinctly. The applications to be developed in the organizations need to be synchronized with SOA in order to obtain the flexibility which SOA can provide.

4. WHAT ORGANIZATION SHOULD DO TO IMPLEMENT SOA SUCCESSFULLY?

In many organizations, IT infrastructure is such that, they are rushing to meet the immediate requirements instead of following a sequential and systematic plan. To adopt SOA such that maximum reusability is achieved and redundancy is minimized, organization needs to concentrate on some of the key concepts. The organization needs to have full governance over the implementation from the very beginning of the development process of the application which can be clear from the fig (2).
This approach for developing any application will help the organization to move forward, making the maximum use of already existing services thereby reducing the redundancy. The fig (2) explains the implementation of SOA in System Development Life Cycle from the very beginning of the first stage, i.e., Requirement Determination. The various steps of SDLC and need to SOA at each step is explained as below:

- **Requirement Determination:** In this stage, services need to be determined which can be implemented to fulfill the user requirements.
- **Initial Requirement Specification:** In this stage, organization need to find the services that can be reused from other services.
- **Feasibility Analysis:** In this stage along with the feasibility check of the requirements the organization need to check the feasibility of the services which can be reused.
- **System Requirement Analysis:** In this stage the services that can be implemented in the system is extracted from other applications so that they can be reused here.
- **System Design:** In this stage, the system has to be designed keeping in mind the security aspects of the services which are to be reused.
- **Hardware Study:** Portability of the services with respect to the system has to be checked.
- **System Implementation:** Keeping in mind that weakest link in the services determine the extent of security, the system has to be implemented such that systems data is secure enough.
- **System Evaluation:** In this step, organization needs to test the services implemented for the system.
- **System Maintenance:** Just change the services that you need to be modified.

Problem of this proposed approach:
1. Insecurity aspects.
   The system when implemented through services from different applications at all the levels of system development becomes more insecure as it is now more prone to disclosure of data/information to other applications.
2. In some steps, instead of reducing the complexity it may result in more complexes and messed up resulting in failure.

**CONCLUSION**
This paper is written to cover all the benefits, need, risks and challenges involved in SOA which will help to simplify the test approach to be followed for delivering the required application effectively in time, free from defects and within budget. SOA is being adopted by different companies to meet the need, so a focus on SOA testing helps the companies to work out with SOA effectively. In an organization SOA need to be implemented from the beginning of the development of a system and not to be run parallel with other systems. This will help the organizations to provide the services and system within given time, within budget and minimizing the complexity. Testing SOA applications is still in its early stages so need to be highlighted upon.

**FUTURE SCOPE**
As the theoretical study of SOA is far ahead than practical implementation in organizations. The way SOA is implemented in various organizations is studied and how it can be better implemented is focused upon. Implementing SOA from the very beginning of system development with enable the organizations to implement it effectively. This will help the organizations to provide the services and system within given time, within budget and minimizing the complexity. Testing SOA applications is still in its early stages so need to be highlighted upon.

**REFERENCES**


