

**Service Oriented Architecture
(SOA) and Enterprise
Architecture (EA)**

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1. Introduction

There has never been a greater need to transform from today's inflexible business environment to an agile enterprise. Yet today's structures, processes and systems are inflexible and incapable of rapid change. More computer hardware, software, packages, staff, and outsourcing are not the solutions; they are only part of the problem. The solution requires methods for rapid business change, with systems that also change in lock-step. This is not a computer problem; it is a business problem.

Companies are adopting an end-to-end Enterprise Architecture approach to help re-align IT developments with business objectives to address the growing gap between IT and business. The problem does not end here, because challenging market conditions, competitive pressures and new technologies are leading many companies to re-evaluate the way they purchase, deploy, manage and use business applications. Software buyers want applications that leverage their existing investments. Customers demand solutions that provide quantifiable performance improvement. These forces are driving the software industry to deliver breakthrough technology, with many of these breakthroughs at the foundation layer. Service-oriented architectures (SOAs), specifically, are at the cusp of change.

Research Questions

SOA is also tasked to bridge the gap between Business and IT through business-aligned services. It is obvious that EA and SOA share a similar goal. EA is a framework that covers all the dimensions of IT architecture for the enterprise, and SOA provides an architectural strategy that uses the concept of "Services" as the underlining business-IT alignment entity. However, EA itself is a challenging and confusing concept to adopt [7].

We address the following questions in this research:

- If organizations are finding EA challenging and confusing, how do they fit SOA with EA which is even more challenging? How do organizations view the relationship between EA and SOA?
- Do they see any business impacts by adopting SOA?
- If companies see any business impacts at all, are they in higher levels/*stages* of SOA adoption?

The purpose of this research is to understand how different organizations view the value of Enterprise Architecture frameworks in relation to Service oriented architecture, and to determine how effective each is in addressing business needs. Most of the previous research in this area focused on one aspect of our research, either on EA or SOA. As it is getting extremely difficult for IT to respond quickly to new business models that require integration across business units [4, 5], we sought to concentrate on carefully understanding the relationship between EA and SOA their collective impact.

First, we present the necessary background about Enterprise architecture and SOA. We will then attempt to discuss how SOA fits in with EA, and towards the latter part of this article we discuss key findings based on our survey analysis. Finally, we will draw conclusion from our survey analysis.

2. Enterprise Architecture

There are a number of ways to define the term “**Architecture.**” Gartner defines architecture as “*an abstraction or design of a system, its structure, components and how they interrelate,*” which is very similar to the dictionary meaning that states that the term architecture refers to any kind of socio-technical system, and stands for the fundamental organization of its components and their relationships to each other and the environment as well as the design rules for developing and structuring the system. The components are depicted in the form of a building plan while reducing insignificant aspects.

Architectures are usually differentiated into several types according to the main objects they refer to. Usually the types are integrated into a cohesive structure, the enterprise architecture.

These Enterprise Architectures are an emerging approach to capture complex knowledge about organizations and technology.

However, several enterprise architectures have different structures. The **business architecture** is the result of defining business strategies, processes and functional requirements. The **information architecture** describes the data's logical aspects, as well as the management of data resources. The **application architecture** is focused on developing and implementing applications to fulfill business requirements. The **technical architecture** provides the foundation that supports the application, data and business processes. It identifies and plans the computing services that form the enterprise's technical infrastructure. These types of architectures are inter-related.

2.1 Enterprise Architecture Definitions

There are a number of definitions for the term Enterprise Architecture but there aren't any precise definitions of architecture or architectural descriptions as these terms relate to enterprises, systems, or software. The IEEE, the US department of defense(DOD), and other authorities in the industry agree that architecture is about the structure of important things, their components, and how the components fit and work together to fulfill some purpose.

The EA is the Enterprise structure and the operation blueprint describing the current and future states of the Enterprise in terms of Business, Technology, People and Information, and the transformation roadmap, process, program and portfolio, all linked by an EA framework.

1. Enterprise Architecture consists of the vision, principles, standards and processes that guide the purchase, design and deployment of technology within an enterprise. Enterprise Architecture describes the interrelationships between business processes, information, applications and underlying infrastructure for that enterprise, and provides best practices for technology purchase, design and deployment.

Enterprise Architecture structures and processes govern adherence to an organization's technology strategy and provide a managed environment for the introduction of new technology.

-- CoBiT Expert

2. Enterprise architecture is a blueprint that describes the current and desired state of an organization or functional area in both logical and technical terms, as well as a plan for transitioning between the two states. Enterprise architectures are a recognized tenet of organizational transformation and IT management in public and private organizations. Without enterprise architecture, it is unlikely that an organization will be able to transform business processes and modernize supporting systems to minimize overlap and maximize interoperability.

-- **United States Government, Government Accountability Office**

3. An EA is a conceptual framework that describes how an enterprise is constructed by defining its primary components and the relationships among these components.

-- **Melody A. Rood, The MITRE Corporation**

4. Enterprise architecture is the process of translating business vision and strategy into effective enterprise change by creating, communicating and improving the key principles and models that describe the enterprise's future state and enable its evolution. The scope of the enterprise architecture includes the people, processes, information and technology of the enterprise, and their relationships to one another and to the external environment. Enterprise architects compose holistic solutions that address the business challenges of the enterprise and support the governance needed to implement them [23].

– **Gartner**

5. Enterprise Architecture is the organizing logic for business processes and IT infrastructure reflecting the integration and standardization requirements of the company's operating model [23].

6. In its simplest terms, enterprise architecture is the process of aligning a business's strategic vision with its information technology. It connects different business units for synergistic communication and collaboration, creating a more seamless customer (or end-user) experience.

-- **Diann Daniel**

2.2 Overview of the Existing Enterprise Architecture Framework

Organizations could adopt a number of Enterprise Architecture frameworks based on their business purpose. I would like to elaborate on the TOGAF framework as it is one of the most widely used frameworks based on our survey analysis results. I will review why the ZACHMAN framework is not currently used as much as TOGAF, in spite of the fact that the ZACHMAN framework was the first Enterprise Architecture Framework.

0.2.1 TOGAF

The Open Group Architecture Framework (TOGAF) provides a methodology for analyzing your specific situation and turning that analysis into actionable artifacts. Originally designed as a way to develop an organization's technology architecture, TOGAF has evolved into a methodology for analyzing the overall business architecture.

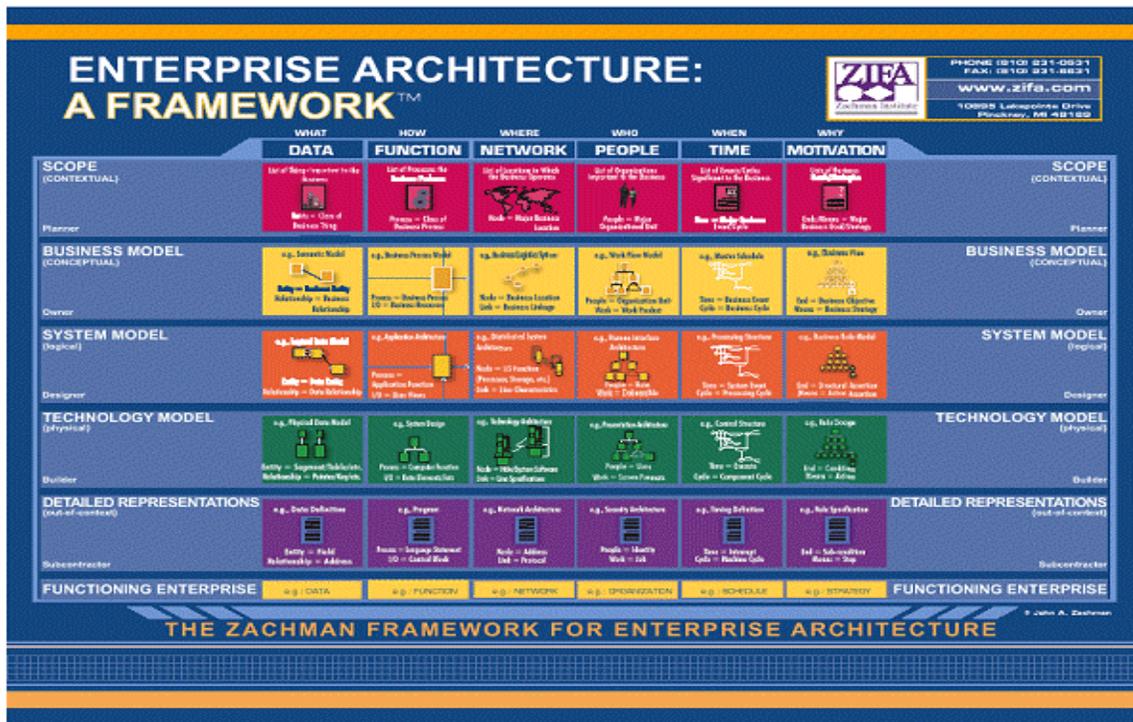
TOGAF is an architecture framework, a set of methods and tools for developing a broad range of different IT architectures. It enables IT users to design, evaluate, and build the right architecture for their organization, and reduces the costs of planning, designing, and implementing architectures based on open systems solutions. TOGAF remains a reliable, practical method, the TOGAF Architecture Development Method (ADM), to define business needs and develop an architecture that meets those needs utilizing TOGAF's and other architectural assets available to the organization.

There is no industry standard for developing an enterprise architecture. The goal of The Open Group with TOGAF is to work towards making the TOGAF ADM just such an industry standard, neutral towards tools and technologies, and useful to develop the products associated with any recognized enterprise framework, such as the Zachman Framework, Federal Enterprise Architecture Framework (FEAF), Treasury Enterprise Architecture Framework (TEAF), and C4ISR/DoD Framework.

The TOGAF ADM does not prescribe any specific set of enterprise architecture deliverables, although it does describe a set by way of example. Rather, TOGAF is designed to be used with whatever set of deliverables the user feels are most appropriate. That may be the deliverables described in TOGAF itself; or it may be the set associated with another framework, such as the Zachman Framework, FEAF, etc.

0.2.2 Zachman Framework

The concept of EA started with John Zachman's "A Framework for Information Systems Architecture" published in the IBM Systems Journal Volume 26, Issue 3. (Zachman, 1987). Zachman states that "to keep the business from disintegrating, the concept of information systems architecture is becoming less an option and more a necessity for establishing some order and control in the investment of information systems resources"(Zachman,1987). Before discussing information systems architecture, he draws parallels to the field of classical architecture where there are different deliverables or representations that an architect has during the construction of a building.



Zachman Framework (Zachman, 2007)

The different representations are bubble charts, architect's drawings, architect's plans, contractor's plans, shop plans, and the building itself. Each representation is a deliverable along the process of designing a building from the most abstract bubble charts to the building itself. Zachman further explains that the models and the different representations can be mapped to cells along an x-y axis. This allows the architecture to be grouped by cells of different classifications. The Zachman Framework can be represented by a 6 by 6 grid of cells.

0.3 Comparison of Zachman and TOGAF

Both Zachman and TOGAF are classified as EA Frameworks that address system complexity and the alignment of business and IT. Roger Sessions's compared the top 4 EA Frameworks (Sessions, 2007). In this article, he describes the Zachman Framework as a taxonomy or classification of architectural assets. This does not help us to classify artifacts into the Zachman Framework as there is no process or instruction.

TOGAF is built to map onto other EA Frameworks, including the Zachman Framework. The Zachman framework is generic as "it does not prescribe or describe any particular method, representation technique, or automated tool" (The Open Group, 2006g). The open group mentions that "the scope of the four architecture domains of TOGAF align very well with the first four rows of the Zachman Framework" (The Open Group, 2006h).

The Open Group maps how to use the Architecture Development Method (ADM) to populate the Zachman Framework from the preliminary phase through Phases A, B, C, and D. The ADM is generally regarded as the strength of the TOGAF EA framework. The combination of the strengths of differing EA Frameworks could be of value in certain organizations.

The TOGAF Framework is a process to generate an Enterprise Architecture. The three main components of the TOGAF help an organization to define their Enterprise Architecture. The ADM process may be used to incrementally define the baseline architecture and how to achieve the target architecture. The Enterprise Continuum is a repository for storing the architectural assets. The TOGAF Resource Base provides templates and guidelines to help in the process. There is nothing prohibiting the use of more than one EA Framework. The Open Group even lays out steps to map the TOGAF ADM to the Zachman Framework. TOGAF provides more detailed steps with a set process and templates while the Zachman Framework does not provide any implementation details.

3. Service Oriented Architecture

As Business and information technology have become increasingly intertwined, the strategic alignment of the two has emerged as a major corporate issue. It has almost become impossible to design one without another.

The strategic relationship between business and information technology has been chronicled as far back as the 1970s, when Harvard Business School Prof. Richard L. Nolan expounded his “stages theory” of the business/IT relationship, the emergence of

IT from the back room to the forefront of e-business brings the alignment issue under the spotlight like never before. As the economy softens, the potential efficiencies and competitive advantages afforded by technology become more crucial. So, as mentioned earlier, altering business processes inevitably requires system changes. Here comes the challenge of designing systems in such a way that accommodating most business process changes simply requires re-arranging existing business services. The business processes involve more than just the functionality of systems. They involve information. Information is central to business processes, and these processes determine what information is required and how it should be managed. That is when SOA enters the picture. We must package a significant portion of the systems’ functionality and related information in the form of services when an SOA is built. A **service** is nothing but a bundling of information and the functionality required to manage it.

3.1 SOA Confusing?

Although SOA is at the top of the hype curve now, the most haunting questions that we would like to address through this research are detailed in forthcoming chapters. SOA reduces cost through service re-use and by promoting modularity at service level, enabling the flexibility and agility required to respond the greater change, but what is SOA? Is it a technology, an architecture, or a product?

There are many perspectives about SOA and how it relates to EA. This, in fact, motivated me to delve deeper into this topic in order to better understand how the members of important organizations such as the “Association for Enterprise Integration” (AEI) view SOA and EA. In this chapter, we will highlight a few of the existing definitions of SOA. Based on our extensive literature survey and the survey conducted within the AEI, we have come up with a comprehensive definition of SOA. After defining the term SOA, I will then describe the most generic view/ perspective of SOA.

3.2 SOA Definitions

Many organizations have tried to define what constitutes service, such as IBM and OASIS to name a few. While they may maintain their esoteric view on the definition, commonalities do exist between their definitions. We will analyze these common features after quoting the definitions. To help us to understand what SOA is:

1. “SOA is a business-centric IT architectural approach that supports integrating business as linked, repeatable business tasks, or services. SOA helps users build composite applications, which are applications that draw upon functionality from multiple sources within and beyond the enterprise to support horizontal business processes.”

IBM, 2007

2. “SOA is a set of components which can be invoked, and whose interface descriptions can be published and discovered.” – **World Wide Web Consortium (W3C)**
3. “Service Oriented Architecture is an architecture style aimed at designing for change with the aim to reduce cost, deliver faster & better and increase the value of IT.”
– **Capgemini**
4. “SOA is a form of technology architecture that adheres to the principles of service orientation. When realized through the Web services technology platform, SOA establishes the potential to support and promote these principles throughout the business process and automation domains of an enterprise.”

–Thomas Erl, chief architect, XMLTC Consulting Inc.

5. “SOA is a framework enabling application functionality to be provided, discovered and consumed as re-usable Web Services sets. While Web Services do not equal SOA, it’s one of the enabling standards. SOA abstracts complexity and implementation details, making it an ideal architectural mindset to leverage functionality trapped within mainframe/midrange systems.”

–Scott Rosenbloom, chief strategist with WRQ Inc.

There are many more definitions but the essence is in the words “service oriented.” These words really speak to the perspective that must be adopted across the enterprise, a *service oriented perspective*. This requires adoption of a propensity to share, to look for an existing service that can be reused from within and outside of the immediate organization. Developing a service from the ground up becomes the exception. The potential for business transformation will require strong collaboration with the business to identify business services that can be shared. [11]

3.3 SOA – A New Definition

SOA is an architectural design or pattern aligning both the IT and conceptual business architectures by utilizing reusable services that are built using the existing business resources. That would help an organization to achieve their business goals without impeding the flow of information within the system. The business resources could mean anything from an application to a business partner in this context.

3.4 Service Oriented Architecture – An Architectural Style

SOA is neither a product nor a technology but rather an architectural style that consists of recognizable and reproducible architectural patterns. It is becoming the architectural style of choice in many enterprises. Particularly in the past few years, Service Oriented Architecture (SOA) has evolved from a concept promoted by few to one of the most important architecture styles adopted by enterprises. Though many of the bases upon which SOA is founded are not new, its link to achieving business results makes it appealing.

Service-oriented architecture (SOA) is an emerging approach that addresses the requirements for loosely coupled, standards-based, and protocol-independent distributed computing. Typically, business operations running in an SOA comprise a number of invocations of these different components, often in an event-driven or asynchronous fashion that reflects the underlying business process needs. A highly distributable communications and integration backbone is required to build an SOA. [19]

Modern enterprises need to respond effectively and quickly to opportunities in today's ever more competitive and global markets. To accommodate business agility, enterprises are supposed to streamline existing business processes while exposing the various packaged and home-grown applications found spread throughout the enterprise in a highly standardized manner. A contemporary approach for addressing these critical issues is embodied by Web services that can be easily assembled to form a collection of autonomous and loosely coupled business processes. [19]

The purpose of this architecture is to address the requirements of loosely coupled, standards-based, and protocol-independent distributed computing, mapping enterprise information systems (EIS) appropriately to the overall business process flow. The driving goal of SOA is to eliminate these barriers so that applications integrate and run seamlessly. In this way, an SOA can deliver the flexibility and agility that business users require, define coarse grained services that they can then use to aggregate and reuse. The goal is to facilitate ongoing and changing business needs.

3.5 SOA Benefits

SOA is valuable to enterprises that need to solve business-critical problems using information technology, including enterprises that want to minimize redundant infrastructure and create a common business interface across customer and employee systems; businesses that need to personalize information to users based on roles and workflows; and organizations that want to use the Internet to boost revenue per customer through cross-selling, up-selling and access via mobile devices.

Enterprises that adopt a service-driven approach experience the following business and IT benefits:

Business Benefits of Service-Oriented Architecture

- 1. Efficiency:** Transform business processes from siloed, replicated processes into highly leveraged, shared services that cost less to maintain.
- 2. Responsiveness:** Rapid adaptation and delivery of key business services to meet market demands for increased service levels to customers, employees, and partners.
- 3. Adaptability:** More effectively roll out changes throughout the business with minimal complexity and effort, saving time and money.

IT Benefits of Service-Oriented Architecture

- 1. Reduced Complexity:** Standards-based compatibility versus point-to-point integration reduces complexity
- 2. Increased Reuse:** More efficient application/project development and delivery through the reuse of shared services, previously developed and deployed
- 3. Legacy Integration:** Legacy applications, leveraged as re-usable services, reduce the cost of maintenance and integration

Today's service-driven enterprises are experiencing these benefits and more as they leverage IT in the rapid development and reliable delivery of new and enhanced services that maximize business opportunities.

4. Enterprise Architecture & Service Oriented Architecture

Enterprise Architecture and Service Oriented Architecture take similar stances to viewing Enterprise IT assets. Both require an enterprise view of the organization to streamline any individual business unit projects to improve alignment. There are SOA architects who are turning to EA Frameworks to help them with their SOA implementations. The Enterprise Architecture Frameworks guides the architect to a higher, more abstract view of the enterprise's IT assets and business processes. There are common themes between both the EA and SOA worlds.

Our analysis of survey results shows that close to 55% of the participants agree that they view SOA as a part of EA and another 43% of our respondents see EA and SOA as two complementary concepts suggesting the importance of them working in tandem.

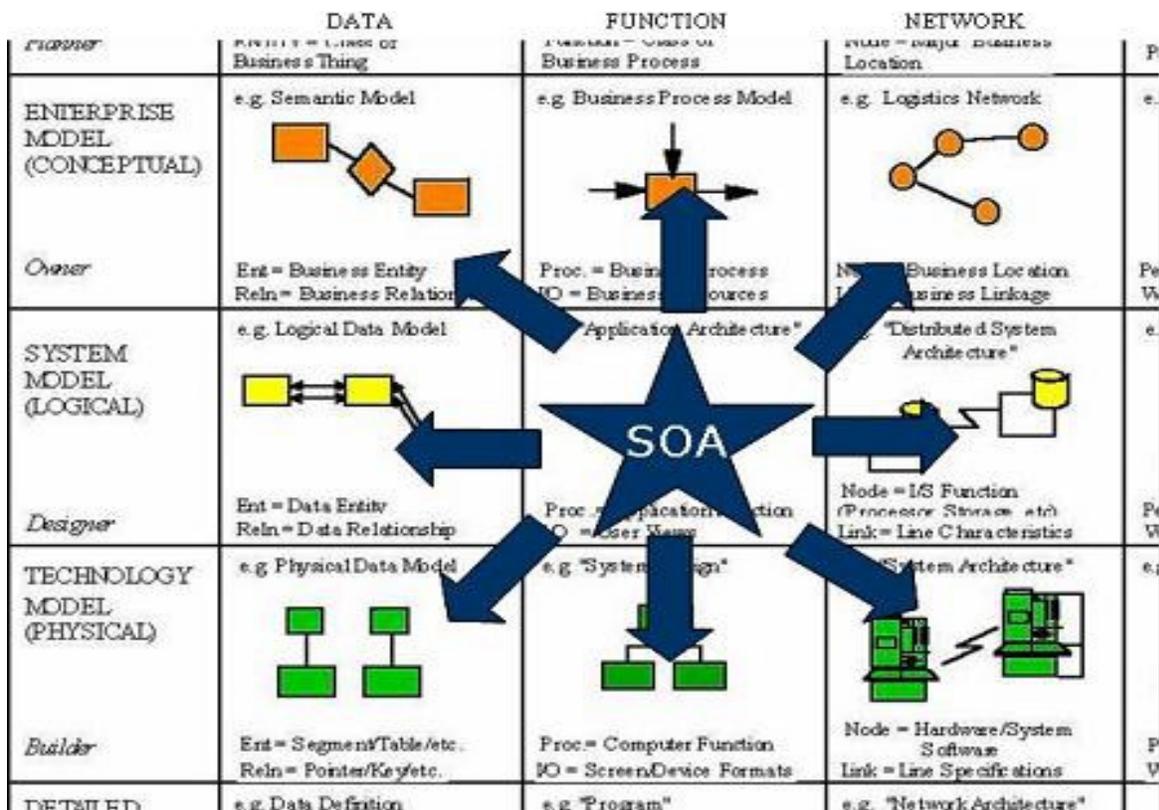
Having analyzed the survey results, it was clear that the majority of participants viewed SOA as an architectural style that fits well within EA. In other words, SOA is being viewed as a part of EA. So, based on this analysis, I would like to discuss the mapping of EA, in particular the mapping of ZACHMAN and TOGAF to SOA.

0.2 Mapping the Zachman Framework to SOA

The Zachman Framework is the most popular EA Framework. Enterprise Architecture looks at IT from an Enterprise level rising above project or line of business views. SOA can benefit by classifying existing IT assets and business processes together. The Zachman Framework, as previously outlined, is presented in two dimensions to map views of the Enterprise. SOA shares similar goals to EA in respect to different views to identify enterprise concerns and interests. Reuse & consolidation through some form of governance are made easier through this visualization. The Zachman Framework provides this matrix to visualize the Enterprise as a whole. Zapthink, an IT advisory firm, has published some thoughts on how the Zachman Framework can map to SOA. They state that the Zachman Framework “helps companies organize and prioritize the various perspectives of EA, and this organization applies just as well when the EA is SOA” (Schmelzer, 2006). Due to the similar goals of EA and SOA, it can

be seen that the use of an existing framework like Zachman can provide value to SOA. In mapping this EA framework to SOA, Zapthink outlines that the understanding to be gained among the various Zachman perspectives is the key strength of the framework. They go on to mention that the Zachman framework must be tailored to the specifics of SOA.

Zapthink mentions that the “logical starting point for applying the Framework to SOA is the Application Architecture portion at the intersection of the “Function” column and “Logical System Model” row” (Schmelzer, 2006) This is the logical starting point for services that “tackle the problems of integration, asset reuse, and loose coupling of systems” (Schmelzer, 2006)



Mapping SOA to Zachman (Schmelzer, 2006)

Services may be mapped into this cell. You can describe the adjoining 8 cells in further iterations. The Zachman framework does not explicitly provide the process to populate the individual cells. The Zachman eBook outlines that slivers of the enterprise may be documented; the same may be done with services and affected assets including business processes, networks, and data. These slivers may be either vertical or horizontal in respect to

the classification process, the Zachman framework allows one to see relationships emerge among identified assets. The unpopulated cells are gaps. The organization can populate the cells with known artifacts to create a better picture of the current architecture.

0.3 Mapping TOGAF to SOA

The Open Group SOA published a white paper to “create a high-level understanding of SOA and its relation to enterprise architecture and in particular to TOGAF” (The Open Group, 2007a). This white paper describes how TOGAF can be applied to SOA by focusing on the eight iterative phases of the TOGAF ADM.

This article will only outline some of the changes provided to these phases:

1. Architecture Vision: the general approach is not changed
2. Business Architecture: 2 major differences
 - An SOA project, it will be natural and desirable to describe the business operations as services.
 - This phase may require describing new business operations and methods for future use, aiding in SOA business agility
3. Information Systems Architecture
 - Must consider how services will interact with legacy applications
4. Technology Architecture
 - Specification of SOA specific infrastructure (service bus, registry, etc.) will be required
 - Specification of tools to support the methods of phases B & C
5. Opportunities and Solutions: SOA has little impact
6. Migration Planning: SOA has little impact
7. Governance
 - “Focus on governing the service lifecycle, supporting service infrastructure, and compliance with the SOA of the organization”(The Open Group, 2007a).
8. Architecture Change Management
 - Changes to services should not be considered architecture change and can be covered by Implementation Governance.

5. Enterprise Architecture & SOA - Survey Analysis

Organizations must aggressively address disconnections between business requirements and IT to remain competitive. A failure directly impacts the enterprise's ability to make quick, accurate decisions and delays implementation of the determined course of action. The gap between IT capability and business needs cannot continue. Adoption of a sound EA & SOA approach will help re-align IT with business objectives.

The principal reward for adopting an enterprise architectural approach is to see the 'business' and 'IT' on common ground, relating with one another. The principal reason why an organization should use an SOA is to increase the free flow of information (flexibility) between the different levels of organization. The ultimate goal of SOA is to enable the whole enterprise to make use of optimized services that can be dynamically configured based on real-time data.

We conducted a survey of Enterprise Architects, and IT Strategists to better understand how companies use EA & SOA. We sent the survey to the professional group "Association of Enterprise Architects" seeking answers to more than 20 questions relating to EA & SOA including the following:

- Main drivers for using EA
- Frameworks that are used to realize EA and SOA
- Whether companies use SOA, if so, in which stage of SOA adoption are they in
- How companies view SOA in relation to EA
- Could SOA be a replacement for EA and
- Need for a framework for SOA

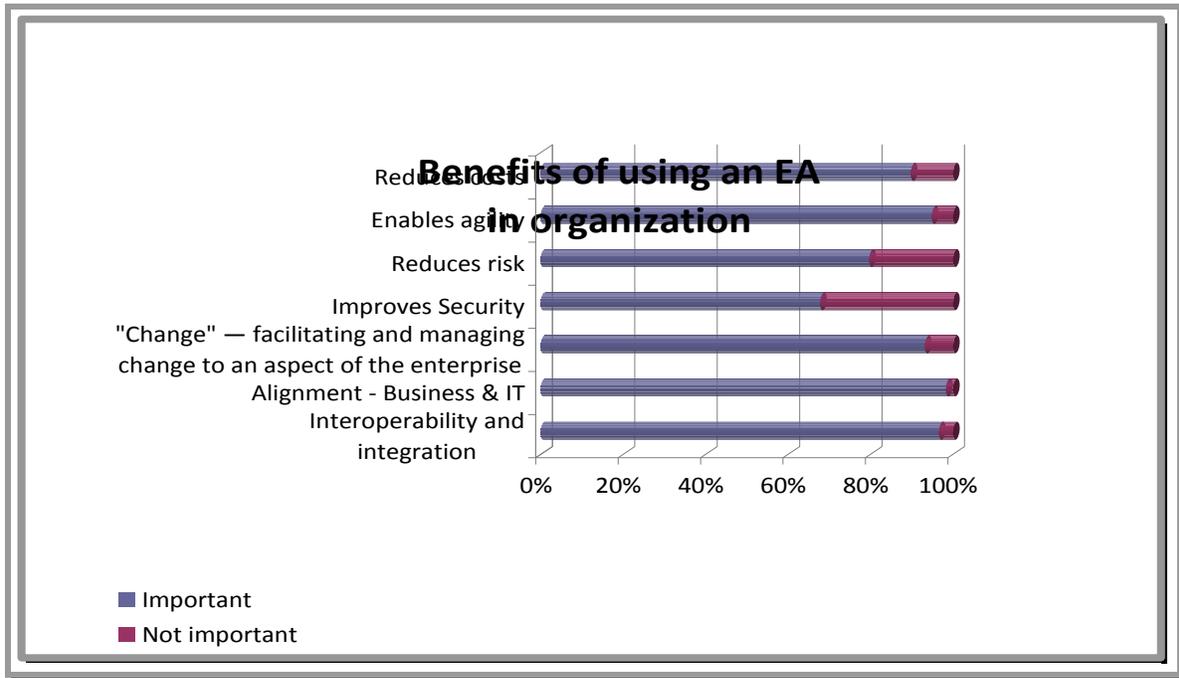
5.4 Adopting EA – Bridging the Gap between IT Architecture and Business Goals

There are different EA approaches representing the users' different views and goals. 'IT-centric' and 'business process centric' approaches are the two most common views of EA. The IT-centric EA approach is primarily used in the IT world to generate an architecture that provides an overview of all the different IT models and resources and how they relate to each other. This IT architecture provides a link up to the business processes; EA is used only as a tool to accomplish those processes. Because of this, many companies still view EA as the IT

department's responsibility. Thus, we can see a gap between the business and the IT world. In the business centric processes approach, the focus is on the business processes and IT supports these processes.

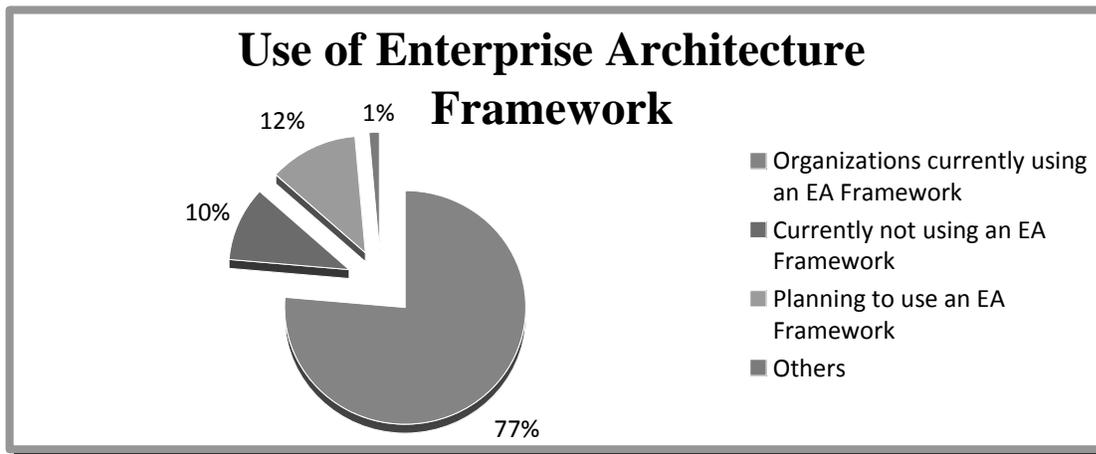
It is evident that bridging the communication gap between the business and IT should be one of the prime motivations for any organization to adopt an EA framework. We confirmed in our survey that a vast majority of companies view the adoption of an enterprise wide EA program to "better align business and IT strategies." This goal is closely followed by their need to "support and enable business change" and then by the need to "Reduce IT cost", suggesting that companies use EA to not only support their business strategies but also as a driver to "enable" business change. This is a marked change in how companies view EA today than they did a few years ago and indicates how the role of EA has evolved.

An illustration of the benefits of using EA:



5. 5 EA Framework

Enterprises can leverage EA benefits only when an EA framework is adopted based on the organizations' goals and their current business & IT processes. Our survey shows that the majority of participants (77%) are currently using an EA program within their organizations; about 10% of the participants are neither interested in nor planning to use an EA framework. In most cases, size is a deciding factor.



There are a number of EA frameworks available in the market; the ZACHMAN, TOGAF and DODAF frameworks are a few that organizations commonly use

The Zachman Framework is a generic classification framework for the Enterprise. It does not prescribe any specific process or tools for completing the mapping or classification process.

In the **TOGAF Framework**, as mentioned elsewhere in the paper, there are three main components that help an organization define their Enterprise Architecture.

- The **ADM process** helps to achieve the target architecture from the baseline or existing architecture.
- The **Enterprise Continuum** is a repository for storing the various architectural assets.
- The **TOGAF Resource Base** provides templates and guidelines to help in the process.

Unlike ZACHMAN, which is a simple and generic framework that does not prescribe or describe any particular method, representation technique, or automated tool (The Open Group, 2006g), TOGAF provides more detailed steps with a set process with templates.

The increasing interest in using a relevant and flexible EA framework that helps organization align the needs and goals of IT with that of business is reflected in the survey; more than 60% of the participants are using TOGAF as their reference architecture and another 28% of respondents are using DODAF, followed by ZACHMAN framework.

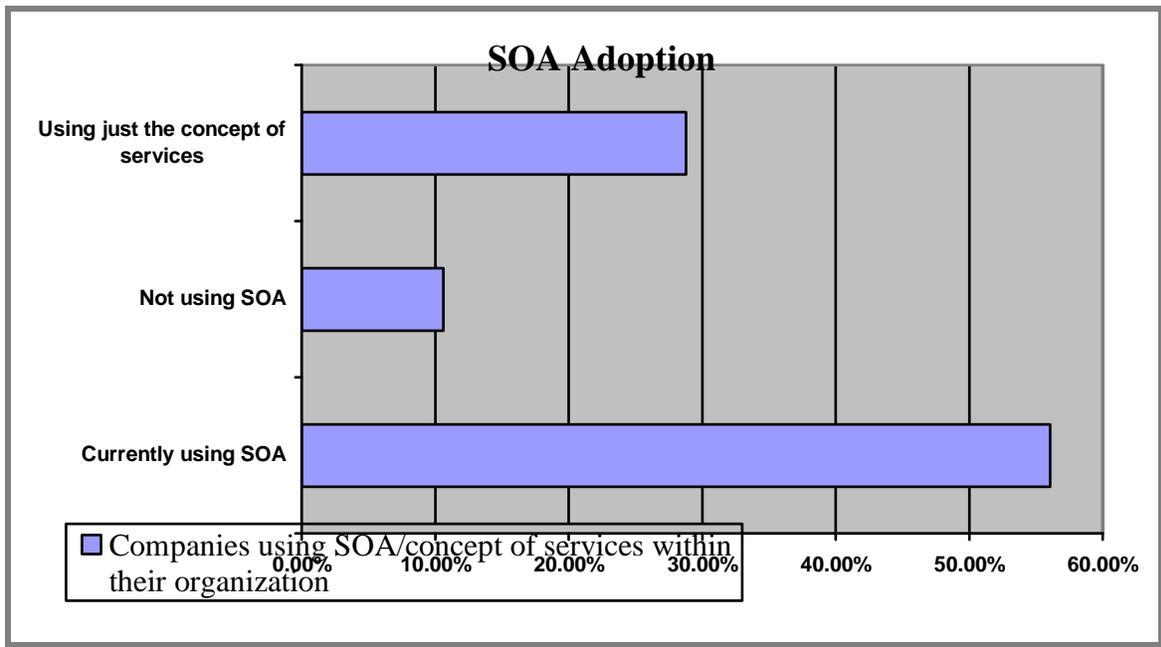
Although we see only 21.6% of the participants as using ZACHMAN as their EA framework, we cannot neglect the fact that ZACHMAN is one of the few most important and the first EA frameworks. Marrying Zachman with TOGAF would be a great idea that organizations could investigate to overcome the shortcomings that we have presented. The open group also mentions that “the scope of the four architecture domains of TOGAF align very well with the first four rows of the Zachman Framework” [10].

5. 6 Adoption of SOA –A Transformation Method for EA

Enterprise architecture efforts are mainly focused in developing a map of IT assets and technology standards, a time-consuming and expensive process. These maps do not make businesses more flexible, capable or profitable. A mechanism that helps organization to deliver standardization and that advocates the reusability of those standards is what makes EA the most responsive architecture. With the “advent” of “SOA” there is finally an understanding of the *value* of architecture, reuse, and services.

Our analysis shows that approximately 60% of the participants surveyed use SOA; another 30% of the companies use the concept of services within their organization. We believe that one of the main reasons for using the concept of services is that companies may be smaller without strict policies, security measures, or procedures to adopt SOA as an architectural style.

The survey strongly shows that organizations have implemented SOA as part of their EA frameworks. Companies must have a full fledged EA framework to reap the benefits of SOA. Many services that might not be capable of communicating properly because of the limited technology/infrastructure support cannot be offered by SOA without EA.

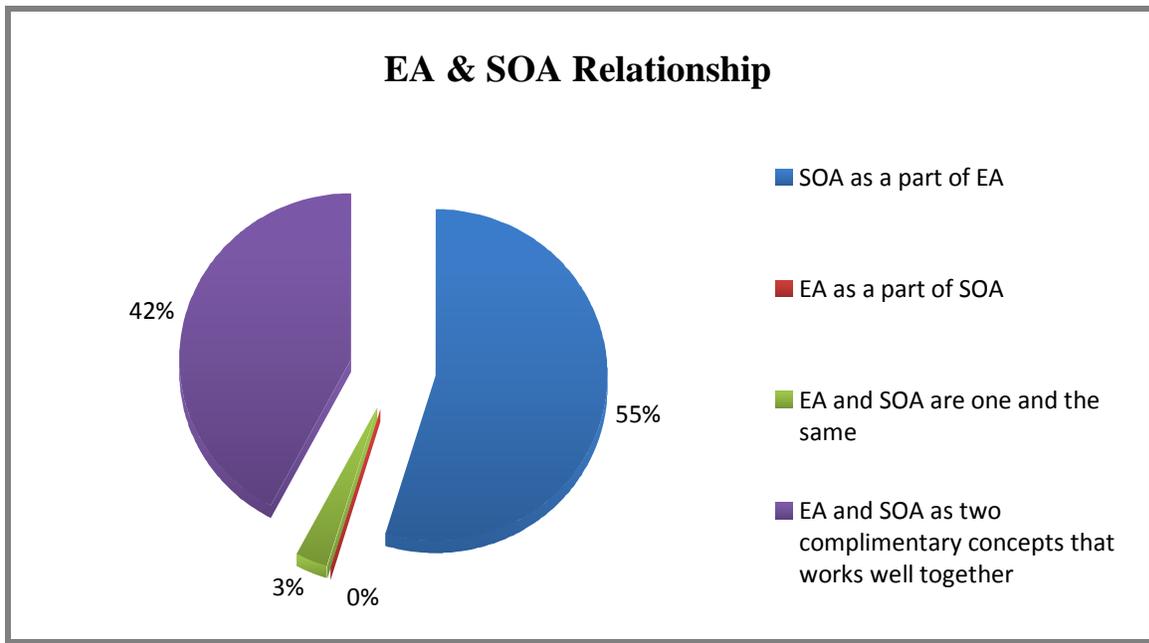


5.7 SOA in relation to EA

Enterprise Architecture and Service Oriented Architecture take views of Enterprise IT assets. Both require an enterprise view of the organization to streamline any individual business unit projects to achieve greater alignment.

Nearly 55% of participants agree that they view SOA as a part of EA and another 43% see EA and SOA as two complementary concepts suggesting the importance of both SOA and EA working in tandem. EA and SOA could be considered two separate concepts that work well together with each supplementing the shortcomings the other.

However, it is certainly not possible to consider SOA as a replacement for EA. As mentioned in chapter 2, EA is the organization’s blueprint to describe its current and future states as a whole, whereas SOA is an architectural design or pattern aligning both the IT and conceptual business perspective by utilizing reusable services. This concept of service could also be implemented between the different layers of Enterprise architecture for the easy flow of information between organizational levels.



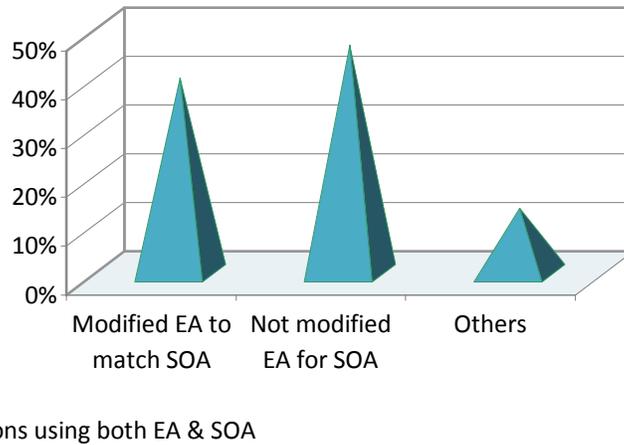
Hence, I believe that it would be more appropriate to view SOA as a means to achieve the overall business goal for which the road is laid by EA. Also, one could view the concept of services/ SOA as an IT strategy that must be tied to EA to maximize flexibility, 43% of our participants agree. Therefore, only when companies understand and make the necessary adjustments to EA so it can be used for SOA initiatives can they reap the full benefits of EA and SOA.

SOA should be teamed with an architecture framework like TOGAF, DODAF to describe a complete system in order to leverage its full advantage.

5. 8 Need for a framework for a SOA

SOA cannot be accomplished without EA. Here we will analyze the key EA features or factors that organizations should look for or incorporate into EA before adopting an SOA. Our survey results show that majority of the organizations did not make any changes to EA; few (43%) have modified their EA frameworks to accommodate SOA. So, we would like to present the features, based on our analyses, that have been either incorporated, changed or removed from the existing EA framework to accommodate EA. This suggests the need for an SOA framework that does not have the pitfalls of the EA frameworks used today:

Modifications made to EA for SOA



1. Ability to integrate services/ modules between different levels/layers of EA
2. The order in which the various models are developed, and the execution and prioritization of some of the EA steps
3. SOA is a discipline and methodology for implementing EA. Adding iteration to define common services, service providers and brokers to the definition of the EA, if necessary.
4. Business process to be described with "service" and aligned with system.
5. Networks are an integral part of EA along with data and process, thereby minimizing the largest element of IT spends.
6. The EA organization could run an SOA Community of Interest (for SOA standards definition and best practice sharing) and an SOA Council for enterprise level governance
7. If EA and SOA were adopted together, the following should be considered :
 - Architecture vision will add the SOA vision
 - Short term and long term goals of SOA should be defined with a strategy.
 - Define the SOA principles while defining the architecture principles, wherever applicable.

8. Since most of the organizations surveyed are using TOGAF as their reference architecture, we would like to present the changes that could be made to ADM cycle in TOGAF :

- In the ADM cycle, provide the SOA flavor while defining the business, data, application and technology architecture.
- Apply the service identification principles, contract design, policy design wherever applicable – all of which constitutes SOA.

5. 9 SOA Performance Metric & Maturity level

An SOA maturity model is used to assess the current state of SOA adoption in an organization. This model helps to understand the current state of the organization (As-Is) and helps organization to develop a game plan to achieve the goal state (To-Be). About 67% of the participants said that they are measuring the performance of SOA in their organization. Among those who are measuring SOA performance, nearly 42% of participants chose, “Service reusability” as the primary metric.

Although a reasonable percentage of organizations have some metric for measuring SOA, the analysis shows that there aren't many organizations that have adopted a cross-business unit level of SOA and/ or an Enterprise level SOA. Organizations will notice that reusability would not be an issue at higher levels as they move up the ladder of their SOA adoption. But the fact that a majority of the organizations are using “Service Reusability” as a key metric shows that there is long way for organizations to go in adopting an SOA before expecting ROI from its adoption of SOA [13]. Companies used other metrics such as “Time to market reduction, “cost-reduction,” and “Business Alignment,” etc., (<10% each). Hence, we feel that most organizations are still in the fundamental stages of SOA adoption. A higher level of SOA adoption/maturity is required for organizations to solve business problems and find new ways to improve efficiencies within their business process.

6. Conclusion

Service Oriented Architecture is designed to increase organizational agility through the use of reusable services [16]. An enterprise view is required to help SOA succeed. As mentioned in the survey analysis and the business benefits of SOA, the use of EA Frameworks means that SOA services can be created in a manner that best benefits the organization's business or long term goals [16]. Zachman and TOGAF are both being used to help implement SOA across the industry.

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