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Service-Oriented Architecture Integration
Within Enterprise Architecture: A-Priori Model

Ayed Alwadain
School of Information Systems
Queensland University of Technology[1]
Brisbane, Australia
Email: a.alwadain@student.qut.edu.au
King Saud University[2]
Email: aalwadain@ksu.edu.sa

Erwin Fielt
School of Information Systems
Queensland University of Technology
Brisbane, Australia
Email: e.fielt@qut.edu.au

Axel Korthaus
College of Business, Information Systems Discipline
Victoria University
Melbourne, Australia
Email: axel.korthaus@vu.edu.au

Michael Rosemann
School of Information Systems
Queensland University of Technology
Brisbane, Australia
Email: m.rosemann@qut.edu.au

Abstract

This paper proposes that critical realism can provide a useful theoretical foundation to study enterprise architecture (EA) evolution. Specifically it will investigate the practically relevant and academically challenging question of how EAs integrate the Service-oriented Architecture (SOA). Archer's Morphogenetic theory is used as an analytical approach to distinguish the architectural conditions under which SOA is introduced, to study the relationships between these conditions and SOA introduction, and to reflect on EA evolution (elaborations) that then take place. The focus lies on the reasons why EA evolution takes place (or not) and what architectural changes happen. This paper uses the findings of a literature review to build an a-priori model informed by Archer's theory to understand EA evolution in a field that often lacks a solid theoretical groundwork. The findings are threefold. First, EA can evolve on different levels (different integration outcomes). Second, the integration outcomes are classified into three levels: business architecture, information systems architecture and technology architecture. Third, the analytical separation using Archer's theory is helpful in order to understand how these different integration outcomes are generated.

Keywords

Enterprise Architecture, EA, Service-Oriented Architecture, SOA, critical realism, Archer's morphogenetic theory

INTRODUCTION

A widely adopted approach providing the required conceptual understanding of an enterprise and the way information systems (IS) facilitate its business processes is Enterprise Architecture (EA). EA is "a complete expression of the enterprise; a master plan which 'acts as a collaboration force' between aspects of business planning such as goals, visions, strategies and governance principles; aspects of business operations such as business terms, organisation structures, processes and data; aspects of automation such as information systems and databases; and the enabling technological infrastructure of the business such as computers, operating systems and networks" (Schekkerman 2005, p. 18). As a discipline, EA faces the challenge of responding to the emerging capabilities of both business and IT domains and embedding them in the existing EA frameworks in order to enable true representations of existing organisational elements and their relationships. One of the major paradigms that have emerged in the last ten years is the Service-Orientated Architecture (SOA). As a result, the integration of service-orientation into established EA frameworks and their specific adoption in organisations is of highest relevance (Khoshnevis et al. 2009; Postina et al. 2010; Sanders et al. 2008).

Recent studies have highlighted the need for SOA integration within EA (Legner et al. 2007; Postina et al. 2010; Viering et al. 2009) and so far, there has been a lack of empirical studies that tackle SOA and EA integration (Viering et al. 2009). Further, despite the significance of the use of common terminology and content of architectural descriptions (Greefhorst et al. 2006), the integration of elements and viewpoints of SOA has been approached differently and inconsistently (Postina et al. 2010). It is also worsened by the lack of consensus on EA terminologies, concepts, approaches and outcomes, which leads to confusion in communications within the EA discipline and with EA stakeholders (Luo 2006; Mykhashchuk et al. 2011). Therefore, to understand how these different integration outcomes have been generated, critical realist (CR) theory in the form of Archer's Morphogenetic Theory (1995) is adopted. It is deployed as a means to better understand how the interaction between existing architectural settings and an SOA introduction leads to different evolution outcomes. The aim is

to understand the EA evolution process by clarifying the role of existing EA, SOA introduction and relevant generative mechanisms on the outcomes of that evolution (architectural elaboration).

This paper progresses as follows. The next section presents the research context and problem. Then, the theoretical foundations for this study are discussed. Subsequently, the a-priori research model based on Archer's morphogenetic theory will be proposed. Finally, the summarised findings, limitations and an outlook are presented.

RESEARCH PROBLEM

EA needs to evolve on both representational and architectural descriptions levels. Architectural descriptions are the vehicle for building architectural representations (Martin et al. 2009). The representational level change is related to changes to instances such as business processes or application data (Martin et al. 2009; Shah et al. 2011). The architectural descriptions evolution comprises the changes of the concepts or properties of a system, their relationships and the principles of the system design (Martin et al. 2009). This study focuses on EA architectural descriptions evolution through the focus on one specific new development with substantial impact on EA, namely the emergence of the SOA (Martin et al. 2009; Sousa et al. 2009). By using SOA as an example, we discuss how EA evolves and how EA can cater for such emerging trends.

This study addresses SOA integration within EA as a specific form of EA evolution. The Open Group (2010) defines SOA as "an architectural style that supports service orientation, and service orientation is a way of thinking in terms of services and service-based development and the outcomes of services". SOA stakeholders have various needs, which require sufficient viewpoints to address these needs. Nevertheless, EA frameworks are not yet adequately reflecting the shift towards SOA nor fully addressing the viewpoints of SOA stakeholders (Postina et al. 2010). Further, although both EA and SOA have been in industry for a long period, EA longer than SOA, there is a lack of understanding of the relationship between SOA and EA, which has contributed to a marginal realisation of the combined benefits of both EA and SOA (Kistasamy, et al., 2012). In order to address this challenge, this study is conducted to understand EA evolution due to SOA introduction. A literature survey of current approaches of SOA integration within EA was conducted and a survey of the ways the five most popular EA frameworks accommodate SOA was performed (Alwadain et al. 2011; Alwadain et al. 2013). These studies have revealed significant variations in terms of how SOA is integrated within EA (different outcomes). There is inconsistency in what elements of SOA need to be captured and positioned in the different layers of EA.

In light of the research gap described above, this study adopts Archer's Morphogenetic Approach as a lens to answer the following research question:

- How does the interaction between EA and SOA introduction lead to different integration outcomes?

We argue that by taking a critical realism (CR) stance using Archer's Morphogenetic Theory (1995), we are able to investigate EA evolution in a much deeper way leading to richer insights into the integration of SOA within EA. The rationale of a critical realist study is to explicate a given set of outcomes by uncovering the hypothesised existence of mechanisms that, once activated, could have generated these outcomes (Wynn et al. 2012). CR endeavours to find the answer to the question: What must reality be like in order for an outcome to have happened? A CR researcher's objective is to discover the mechanisms that surface from the interaction of components of agency and structure to produce the outcomes of interest (Wynn et al. 2012). Archer's theory enabled us to investigate the evolution process by looking at the existing architectural conditions, their interplay with SOA and the expected outcomes. Thus, we argue that EA evolution could be improved by using Archer's concept of analytical dualism where structure (EA) and action (SOA introduction) are analytically held apart in order to appropriately study their interaction and understand their interaction outcomes.

ARCHER'S MORPHOGENETIC THEORY

Archer (1995) proposed a morphogenetic approach for studying change. Archer (1995) states that her model uses critical realism and incorporates (1) pre-existing structures that have causal power (generative mechanism), (2) their interplay with other objects that possess causal powers and (3) outcomes arising from the interaction between the above, which happens in an open system. Archer's theory reflects her argument of analytical dualism. Structure (structural conditioning) and agency (social interaction) are held apart analytically in a dualism rather than the conflationary duality. Interaction between structure and agency is complex to properly investigate in social situations and thus an "analytical" dualism whereby structure and agency are analytically separated is proposed in order to appropriately study their interaction (Archer 1995; Cuellar 2010; Dobson et al. 2007). The morphogenetic cycle has three analytical levels: structural conditioning, social interaction and structural elaboration as shown in Figure 1.

First, structural conditioning represents the existing structural properties prior to the intervention. They are consequences of past actions (Archer 1995; Volkoff et al. 2007). Previous cycles have formed a particular set of

existing structures and distributions of resources which condition the actions of existing agencies (Archer 1995; Cuellar 2010).
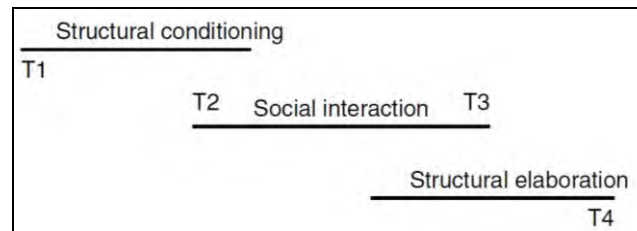

Figure 1. The Morphogenetic Cycle (Archer, 1995)

Second, social interaction is the second analytical level. During social interaction, agents engage with the pre-existing structures (Archer 1995). It starts when one or more agencies decide to make an effort to cause change or maintain the current situation (Cuellar 2010). At this level, actions are enabled or constrained by the pre-existing structures. Finally, the third analytical level is the structural elaboration, either reproduction or transformation of existing structures.

The morphogenetic theory is useful as it considers the pre-existing structural conditions arising from previous interactions between structure and agency. It also pays attention to the importance of time. Social action is conditioned by structures that emerged and endured over long periods of time (Mutch 2010). Third, it offers better clarity regarding the properties of technology (SOA in this study). Disaggregation of technology into levels and features is believed to facilitate the analysis of the impacts of specific combinations (Mutch 2010). In this study, SOA introduction involves an interaction between existing architectural conditions and SOA introduction. SOA introduction has different aspects (different perception, different scopes and different perceived benefits), which need to be understood to comprehend the outcomes. Archer's model provides valuable insights to understand and explain SOA integration within EA leading to a transformation or reproduction of pre-existing architectural conditions. EA is often implemented prior to SOA introduction in organisations. EA as a discipline producing related frameworks and methodologies also existed before SOA emerged. In some cases where EA and SOA could be implemented at the same time, it is still arguably valid to assume that EA as a structure (its framework, methodology) has existed before SOA. It also could be argued that even if an organisation has not implemented a formal EA, there still is an informal EA comprised of applications, business processes and infrastructure its stakeholders are familiar with.

THE A-PRIORI RESEARCH MODEL

Due to the lack of theoretical and empirical evidence of studies investigating the integration of SOA within EA and the differences between the identified studies that previously attempted to investigate the phenomenon, a review of the limited related literature was conducted to identify the relevant structures and their causal powers that were suggested to have an influence on EA evolution (SOA-EA integration and its outcomes). A few empirical and analytical studies have been identified on SOA integration within EA. Joachim (2011) concluded that the number of SOA studies in top journals of the IS discipline is limited. A few relevant articles have been identified through IEEEXplore, SpringerLink, ScienceDirect, EBSCO Host, Business Source Elite and AIS Electronic Library. A combination of "service-orientation", "SOA", "service oriented architecture", "EA" and "enterprise architecture" was used as keywords when searching for articles. The search was extended later based on a go backward and go forward searching strategy (Webster et al. 2002) using Google Scholar. The findings of the literature review are presented based on Archer's theory (1995) to direct the analytical investigation of SOA integration within EA, see Figure 2.

The structural conditioning at T1 is labelled "architectural conditioning" to reflect the scope of this study, which focuses on EA and its subsequent changes as a result of SOA introduction. The social interaction is termed "SOA introduction". SOA activities that are made over the time period T2 to T3 are greatly impacted by pre-existing architectural conditions. Then, "architectural elaboration" represents the result of the interplay between pre-existing architectural conditions and SOA introduction in the form of either "architectural reproduction" or "architectural transformation".
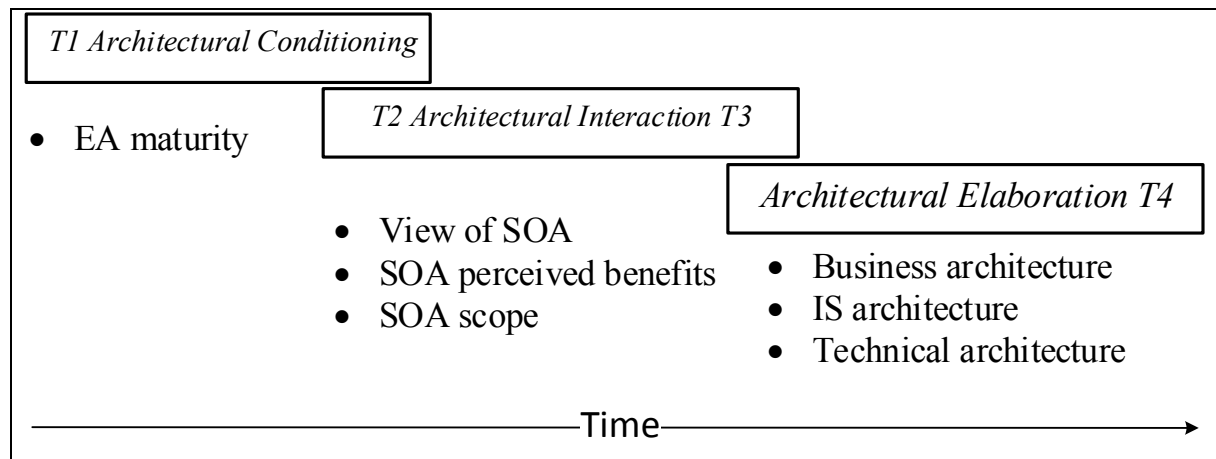
Figure 2. The morphogenetic cycle of EA evolution due to SOA introduction

T1 Architectural Conditioning

Phase one of the morphogenetic cycle is structural conditioning. For the purposes of this study, it is called "architectural conditioning". It is the result of the actions of previous agents. It represents the conditions in which the agents find themselves (Archer 1995). Examples of structures are organisations, markets or sets of ideas (Mutch 2002). IS-related initiatives occur within organisations that have hierarchical structures of previously related activities, associated resources and rules. They engage and impact organisational, managerial and technological aspects of the organisation in which they get implemented (Morton 2006). Examples of other IS structures are IT artefacts or design specifications. If the object of analysis, for instance, were an implementation, the structure would be a business process or processes that would be changed as a result of the implementation (Cuellar 2010). In this study, EA is the main structure that is investigated with respect to its evolution as a result of SOA introduction. In Archer's terms, EA is a structure that has been shaped by previous morphogenetic cycles and SOA introduction results in its architectural elaboration.

EA must always evolve and thus, the concept of maturity was utilised for EA. It assigns different levels of achievement by means of a maturity assessment to multiple EA dimensions. These levels point to how mature these dimensions are (Meyer et al. 2011). In Archer's terminologies, EA as a structure has a generative mechanism, namely its maturity, which has an influence on the world around it. EA maturity constrains or enables the actions of actors. It is measured in terms of an enterprise's capability to manage the development, implementation and maintenance of enterprise-wide architecture on different levels (van der Raadt et al. 2005). EA is still young practice. Its immaturity is noticed by the degree of variety in regard to objectives, methodologies and organizational implementation (Schmidt et al. 2011). Organisations need mature EA in order to successfully implement SOA and realise expected SOA benefits (Perko 2008). EA supports SOA introduction. It facilitates services identification and classification and aligns SOA with the organisational mission (Brooks 2009). EA helps business people better understand SOA (Antikainen et al. 2009) and it is valuable to have business architecture artefacts during SOA implementation to deliver the required set of services (O'Brien 2009). EA should act as a blueprint for SOA and should be used as a starting point for SOA projects. The availability of detailed business architecture models during SOA implementation and architects' skills affect SOA implementation (Kokko et al. 2009). Therefore, we hypothesise that a higher level of maturity enables actors to integrate SOA within EA. Several EA maturity models have been proposed. We studied and compared them; for limitation of space, however, we cannot discuss them in this paper. Most of these EA maturity frameworks have similar dimensions to assess EA maturity (Lagerstrom et al. 2011) and this study adapted the NASCIO Enterprise Architecture Maturity Model (NASCIO 2003). The NASCIO maturity model is considered a good example of EA maturity models by the Open Group and can be used to assess government and private sector organisational EA maturity (The Open Group 2009b). It also conforms to the well-known maturity model SEI SMM (NASCIO 2003) and is widely used (Gosselt 2012).

T2 SOA Introduction T3

The second analytical level is the social interaction, in this study "SOA introduction". According to Archer (1995), during social interaction actors engage with the pre-existing architectural conditions. It starts when one or more actors decide to make an effort to change the system during social interaction or maintain the pre-existing conditions (Cuellar 2010). In this study, agents interact with pre-existing architectural conditioning when they introduce SOA. The interaction is enabled or constrained by the pre-existing architectural conditions and results in one of the architectural elaboration options T4.

The interaction between SOA and agents triggers generative mechanisms that impact SOA introduction. Bygstad et al. (2011) note that it is often a group of objects that trigger a mechanism and generate an outcome that is dependent on the objects, but not reducible to them. The interaction of agents and technology may activate a group of mechanisms pertinent for the IS discipline. Triggering the mechanism and the result it might produce is not predetermined, but will depend on other active mechanisms and the context. Nevertheless, it tends to result in certain outcomes. For instance, user participation in IS development regularly enhances the likelihood of user acceptance, but not always (Bygstad et al. 2011).

Three generative mechanisms are identified from the literature relevant to SOA introduction. Agents introduce SOA entertaining a certain perspective of service-orientation, anticipating certain benefits and determining a certain scope. These generative mechanisms are 'view of SOA', 'perceived SOA benefits' and 'SOA scope'. They are hypothesised to affect SOA introduction and thus its integration with EA. SOA is seen differently. Five different perspectives have been identified. It also offers wide benefits and could be implemented in different scopes. These mechanisms are activated during SOA introduction, when agents interact with SOA. The interaction between social and technical elements constitutes mechanisms (Henfridsson et al. 2013).

View of SOA

Understanding and perception are widely discussed in IS literature. For example, IT and EA perception are found to impact their planning and implementation. Based on the literature review findings, this study hypothesises that there are different views of SOA that have an influence on its implementation. The literature suggests there are different perspectives around SOA. These diverse and different opinions impact SOA's implementation (Viering et al. 2009). Most of SOA definitions are technical. However, recent publications have taken a broader perspective of SOA from a business viewpoint (Joachim et al. 2009; Lee et al. 2010). SOA is being pursued by organisations in different industries not just as an architectural style but also as a business strategy (Chen et al. 2010; Shan et al. 2006). Hirschheim et al. (2010) identified different views of SOA that indicate its adoption maturity. SOA view is organised into five maturity stages: fine-grained service components, emerged software architecture, business process support, enterprise service architecture and adaptive architecture. Each view is associated with different implementations. The first stage represents a very technical view of SOA, while the last one (adaptive architecture) represents the highest level of view of SOA that includes business and IT aspects. Hirschheim et al. (2010) concluded that how SOA is viewed by an organisation impacts its implementation. This study uses their classification of SOA views as described in their studies (Hirschheim et al. 2010; Welke et al. 2011) because it is empirically validated and operationalises SOA view as a generative mechanism which may influence SOA introduction.

SOA perceived benefits

The second suggested factor that may influence SOA introduction is SOA perceived benefits. Many studies have investigated and classified SOA benefits (e.g. see Becker et al. 2009; Lee et al. 2010; Mueller et al. 2007; Seth et al. 2012). Kohlmann et al. (2010) concluded that the design of SOA varies depending on SOA implementation goals. Further, findings from multiple case studies suggest that SOA has multiple drivers. SOA is adopted using different approaches. Each approach is distinguished by a set of related benefits, e.g., to standardise integration infrastructure, to decouple application domains and/or to achieve flexible business process integration. These perceived benefits have great implications on SOA implementation strategies (Legner et al. 2007). Based on the literature review findings, this study hypothesises that different perceived benefits influence the way SOA is introduced and implemented. The classifications of SOA perceived benefits as proposed by Becker et al. (2009) and Mueller et al. (2007) are adapted in this study to examine how SOA perceived benefits influence SOA introduction. These classifications are comprehensive and empirically validated. They are 'IT', 'operational' and 'strategic' benefits.

SOA scope

The literature review suggests that SOA scope is a potential generative mechanism that may influence SOA introduction. SOA introduction requires a fresh approach, clear vision and a multi-dimensional view to understand its scope (Seth et al. 2012). SOA projects have very different scopes (Campbell et al. 2007; O'Brien 2009; O'Brien et al. 2011). Campbell and Mohun (2007) present three different scopes for SOA adoption: project, portfolio or enterprise. Each scope affects different levels of the organisation. Each scope may require different methods and tools to determine its range and its activities and has wide technical and organisational aspects that need to be determined (O'Brien 2009). Each scope has different characteristics and requires different strategies (Campbell et al. 2007; O'Brien 2009). Thus, this study hypothesises that 'SOA scope' is a generative mechanism that is suggested to influence SOA introduction.

Architectural Elaboration T4 (Reproduction or Transformation)

The interaction between pre-existing architectural settings and SOA introduction leads to an architectural elaboration. It results in either architectural transformation (EA evolution) or reproduction of EA (no changes). The literature findings suggest that there are different architectural elaboration outcomes of the interaction between pre-existing EA and SOA introduction. They are classified on three levels: 'business architecture', 'IS architecture' and/or 'technical architecture'. EA frameworks use different architectural layers. Thus, this study aimed at finding common layers in the literature to use them to structure the findings. These layers of: EA, business (information, applications) and technology are widely accepted and used within the Enterprise Architecture discipline (Lankhorst 2004). Additionally, The Open Group Architecture Framework (TOGAF), a widely used EA (Infosys 2009), uses a similar structure: business, information systems and technology. Therefore, this study adopts the three layers: 'business', 'information systems' and 'technology' to structure the findings to represent the different levels of SOA integration within EA outcomes. The architectural elaboration could happen on one or more of these levels.

Business Architecture

The first form of architectural elaboration is on business architecture level. It could be a transformation or a reproduction of pre-existing business architecture. The transformation means that SOA and its relevant elements such as business services, service channels, SOA vision, drivers, services SLAs and QoS are integrated within business architecture. It often builds on SOA integration within the lower architectures (e.g., IS and technical architectures).

First, several conceptual studies integrated SOA within the well-known Zachman framework on a new column specifically to describe services (Correia et al. 2007; Khoshnevis et al. 2009). Iacob et al. (2007) showed how ArchiMate is developed as a modelling language that uses services on all the three architectural layers. TOGAF 9 integrated SOA elements within all its three architectural layers (The Open Group 2009a). Aier and Gleichauf (2009) proposed a three layers enterprise architecture representing service-oriented process architecture, service-oriented integration architecture and service-oriented software architecture. Postina et al. (2010) proposed a meta-model that integrates services on business, IS and technology architectures.

Yet, there are discrepancies in these approaches in terms of the integration level and details given. TOGAF and ArchiMate even use different naming for their services. TOGAF calls them business service, IS service and platform service. On the other hand, ArchiMate has a business service, application service and infrastructure service elements. They also have differences in their coverage of other SOA elements (Alwadain et al. 2013).

Information Systems Architecture

The second level of architectural elaboration is on the IS architecture level. It could be a transformation or a reproduction of pre-existing IS architecture. The transformation means that SOA and its relevant elements such as IS services, service descriptions and SLAs are integrated within the IS architecture. This section provides examples of the integration at this level. First, Laplante, Zhang and Voas (2008) argue that SOA belongs to the Network (Where) column in the Zachman Framework. The SOA network model is a list of possible services to be used in a software system under development. Second, Schelp and Aier (2009) reported the findings of the introduction of SOA in a bank in Switzerland. Several architectural levels are distinguished: business, application (integration), software component and technical architecture. SOA is introduced to improve application architecture by reducing the integration complexity of more than 450 systems. Third, another company is a telecommunication service provider in Germany (Schelp et al. 2009), where SOA is adopted to reduce the complexity of its distributed application landscape. Enterprise services were integrated within the integration architecture while basic services (software components) are integrated within the software architecture. Fourth, in the enterprise model by Erl (2005), the service layer is located between the business process layer and the application layer. Fifth, Jung (2009) defined SOA as an approach for application design and development and integrated it with EA on the applications level. Sixth, Kistasamy et al. (2010) proposed the integration of services and services components within application architecture. Sutherland (2013) also proposed the integration of services and its components within the application architecture.

Technical Architecture

The third level of architectural elaboration is on the technical architecture. The transformation at this level happens when SOA and its relevant elements such as technical services, services monitoring, services security, ESB, XML standards and web services are integrated with this architectural level.

Some examples of this integration are found. First, the NSW Departments of Lands adopted a service-oriented architecture approach to transform its technical architecture using SOA. It started when an ESB was first introduced in 2005. Second, a logistics operator in Finland adopted SOA during 2005. It was an IT-driven

project using a technical bottom-up approach and SOA was almost reduced to the use of web services. Later, it was expanded into multiple projects to integrate the legacy system landscape employing SOA technology to mainly expose legacy system services via an integration platform (Kokko et al. 2009). Third, a public sector organisation in Finland adopted SOA to build a service platform and J2EE-based infrastructure platform to support XML and web service interfaces. Later the platform was expanded in iterative SOA projects (Kokko et al. 2009). Sixth, Kistasamy et al. (2010) also suggested the integration of ESB, QoS and services monitoring within the technology architecture. Sutherland (2013) also suggested that SOA related elements such as QoS, security and monitoring should be integrated with the technical architecture.

CONCLUSION AND OUTLOOK

As a result of the dynamic environment, the increasing pace of change and technological innovation, organisations are faced with huge challenges not only of assessing how their businesses could be improved but notably how their enterprise architectures are going to be impacted. EA is a management instrument that helps organisations understand their business/IT landscapes and enable decision makers to make informed decisions. EA need to evolve in response to new technical and business paradigms. In general, there is lack of empirical studies that describe EA evolution. In addition, there is a need to understand how SOA emergence impacts EA. A limited number of studies have attempted to integrate SOA within EA. Yet, there are different outcomes, different emphases and different representations of SOA elements. This study employed critical realism using Archer's Morphogenetic Theory to propose a model to understand EA evolution due to SOA introduction. This study is undertaken to build the foundations for subsequent empirical phases to further understand and explain EA evolution (SOA integration within EA) in order to identify opportunities for improvement. It also helps clarify the different levels and properties of SOA (its generative mechanisms when introduced) to better recognise its relationship to EA.

The study has proposed an a-priori model that helps understand the outcomes and the process of SOA integration within EA. In order for us to understand the architectural elaboration, we have to analytically separate the pre-existing conditions from the action to comprehend their interplay. The main findings of this study are fourfold. First, in Archer's terms, architectural conditions at T1, before an SOA introduction, are the results of previous actions. These architectural conditions have an influence through their generative mechanism (EA maturity) on the action of agents (SOA introduction). The maturity of EA either enables or restricts the integration. Second, the action of introducing SOA has its own generative mechanisms pertinent to the relationship between SOA and the agents involved. These generative mechanisms are the view of SOA, SOA perceived benefits and SOA scope. SOA introduction is driven by certain perspectives, particular benefits and determined scopes, and thus influences the way SOA is implemented and thus its integration within EA. Third, the interaction between the architectural settings (T1) and SOA introduction (T2-T3) results in architectural elaboration (T4) - either transformation or reproduction. Fourth, the elaboration (the integration outcomes) is classified into three levels: business architecture, IS architecture and technology architecture. SOA can be integrated within EA at one or more of these architectural elaboration outcomes. This paper echoes the recent argument of Dico (2012) that EA and SOA integration need more emphasis. The majority of EA programs are limited in both EA and SOA practices, and are not comprehensive enough to deal with and manage the associated complexities. Those EA programs also suffer from the inability to leverage EA and SOA (Dico 2012).

The paper derives its significance and relevance from interrelating important contemporary phenomena based on a sound theoretical foundation. It uses a sound theoretical underpinning to enrich the understanding of SOA integration within EA. In particular, Archer's Morphogenetic Approach is employed as an analytical framework to exemplify the interaction between pre-existing architectural settings, the actions taken to introduce SOA and the elaborations occurring as a result of that interaction.

The preliminary findings presented above will be refined and extended using qualitative interviews with experienced enterprise architects to further enrich the understanding of EA evolution. Then, the final model will be tested in multiple case studies to examine the impact of the architectural settings on SOA introduction and the impact of their interplay on architectural elaboration. Further, the proposed model could be used to examine EA evolution due to other emerging trends such as cloud computing to better understand the evolution process and outcomes, and improve the evolution.

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