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**THE MATURITY OF ENTERPRISE ARCHITECTURE AND
CHALLENGES TO ITS EVOLUTION IN THE SOUTH AFRICAN
PRIVATE HEALTHCARE SERVICE INDUSTRY**

by

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**A research project submitted to the Gordon Institute of Business Science,
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Abstract

South Africa has a well defined, highly complex private healthcare services industry with a high reliance on the use of intricate IT systems to ensure its sustainability. The required competitive advantage through better decision making and improved outcomes measures may be facilitated by an agile, IT aligned Enterprise Architecture, which is rapidly becoming a basic ideology of IT. This research project presents the findings of an investigation conducted to assess maturity levels of Enterprise Architecture and the associated challenges to its evolution in the South African private healthcare service industry. In fully exploring this, both quantitative and qualitative approaches are used to address the respective research questions. A quantitative approach in the form of a survey and Enterprise Architecture maturity assessment served to determine the IT demographics and Enterprise Architecture maturity levels respectively. A qualitative approach, facilitated by in-depth interviews, served to identify the emergent themes highlighting the challenges facing the implementation and evolution of Enterprise Architecture. The collected data was analysed by thematic analysis

Key findings for this research conclude that IT is of vital importance to sustaining day-to-day operations and long term strategic objectives of these organisations; Enterprise Architecture maturity is low, assessed as being ‘under-development’, which is related to elements of the Enterprise Architecture being omitted, due to their associated costs and perceived poor return on investment. The prevalent challenges to the implementation and evolution of Enterprise Architecture, is summarised as being; the need for skilled resources and resource time; the need system standardisation; the need for a positive return on investment; the need for a business understanding of Enterprise Architecture; removal of existing legacy systems; and the industry related legislation.



Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Masters of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University.

Valter Adão

Date



**“Leadership is a potent combination of strategy and character.
But, if you must be without one, be without strategy.”**

General H. Norman Schwarzkopf



Dedication

To my Mom and Dad. You are my strength.

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1. Chapter 1: Introduction to the Research Problem

1.1. Introduction

This research study focuses on the maturity levels of the Enterprise Architecture and challenges to its evolution in companies that play a significant role in the private healthcare service industry in South Africa. Current IT Healthcare systems are challenged with understanding the total service demand imposed by their user communities, how much their limited resources are available to meet that demand and ability for their IT infrastructure to support these business requirements (Stefanou and Revanoglou, 2006). This is further challenged by the private healthcare service industry's need to remain viable and competitive in an increasingly difficult trading environment created by the incumbent legislation and governance requirements as determined by the Council for Medical Schemes. According to Jaffe, Nash, Ash, Schwartz, Corish, Born and Lazarus (2006), healthcare costs are an ever-growing segment of any country's economy, with an expected future growth that is viewed as not sustainable through this century. A large growing component of this increased cost is due to administrative overheads and redundancies that could be reduced with better strategic planning, tactical implementation and information technologies. A sustainable competitive advantage through better decision making and improved outcome measures may be facilitated by an agile IT aligned Enterprise Architecture (EA) backed up by flawless execution (Varghese and Kurien, 2004). The growing trend world-wide across a variety of industries is to address similar challenges by the introduction of enterprise resource systems and IT governance

protocols, allowing organisations to respond rapidly to changes in a dynamic environment (Van der Klashorst, 2001).

Enterprise architecture doesn't happen at once. It is an iterative, maturing discipline that provides management the operating discipline for organising and engaging business and technology components to fulfil the mission of the organisation (Schekkerman, 2006). Therefore, the growing trend within healthcare organisations is to increase their IT spend to address the above and to appropriately govern their IT environment (Mohrmmann and Kropf, 2007). This research study aims to define where organisations in the private healthcare service industry are in terms of EA with the use of an extended Enterprise Architecture maturity model (EAMM), and simultaneously identifying the challenges faced by these organisations in successfully progressing to the next level of maturity (Schekkerman, 2006).

1.2. Research Scope

The scope of research is described by the definition of the following relevant terms:

1. The primary unit of analysis is companies trading in the South African private healthcare service industry and will be described in terms of the value chain of healthcare service delivery which is compromised of:
 - Providers of Healthcare, defined as providers of private professional health services for reimbursement. They are registered to perform these services with the relevant statutory professional bodies (CMS, 2006).
 - Enablers of electronic claim submissions. This leg of the value chain of healthcare services would include:

- a. Pharmacy (Health) electronic benefit managers (PeBM). These are companies that process private healthcare claims electronically on a real-time basis against medical schemes' clinical and financial rules. They offer a financial and clinical risk management services to the providers of healthcare, medical schemes and administrators (CMS, 2006).
 - b. Practice Management System (PMS) vendors, which are medical software systems, with embedded data bases and embedded interfaces, with inventory and accounting functions (Miller, R.A. and Gardner, R.M., 1997)
 - c. Electronic Data Interchange (EDI) vendors, which are a computer based interchange linkages, between the members of the healthcare service value chain (O' Callaghan, R. Kaufmann, P.J. and Konsynski, B.R, 1992).
- Medical Scheme Administrators are defined as 'for-profit' organisations that are legally obliged to be accredited by the Council for Medical Schemes to administrate medical schemes contracted to them in accordance to the statutory requirements of the Council (CMS, 2006). Most of the administrators are divisions of listed companies. Medical Schemes are defined as "not-for-profit" organisations with the fiduciary responsibility to manage and design healthcare benefits for its members (CMS, 2006).
2. For the purpose of this study, companies in the private healthcare service industry with a minimum annual turnover of R100 million and with a dedicated Information Technology (IT) department will be targeted. Companies with an outsourced IT department will be excluded from this study.
 3. The secondary unit of analysis is the Chief Information Offer of the organisation, who is the primary stakeholder of EA and who should guide EA research and framework development or the individual who holds the relevant responsibilities in the last twelve months (Lindström, Johnson, Johansson, Ekstedt and Simonsson, 2006). As

not all companies have a formal CIO, the following individuals will be considered for the purpose of this study:

- A leader and manager of high performance IT staff.
 - A major contributor to the organisation's strategy development.
 - The individual tasked with the continuous focus on aligning business imperatives with IT direction.
 - The individual able to lead and support major change within organisational processes.
 - The individual tasked with managing and proactively driving down IT related performance problems.
 - The individual responsible for the overall IT budget with regards to functional IT spend vs. strategic spend.
 - The individual tasked with an EA implementation project or already holds this responsibility.
 - Dependent on the organisation, these individuals may be CIOs, CEOs, CFOs, IT Directors or Business Managers (or a combination thereof).
4. For the purpose of this study, the Enterprise Architecture is described as follows:

“Enterprise Architecture is a complete expression of the enterprise; a master plan which acts as a collaboration between the 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 enabling technological infrastructure of the business such as computers, operating systems and networks,” (Schekkerman, 2004, p. 4).

1.3. Research Motivation

A Significant amount of research has been conducted on Enterprise Architecture (EA) with a majority of the work having an international focus. This in turn has mostly been done in the context of North American and European organisations. Elements of EA in South Africa have been investigated and analysed by, Van der Klashorst (2001) and Matthee, Tobin and Van der Merwe (2007). The nature of the papers in both instances has been focused on the South African financial services sector, which is considered to have a high dependency on Information Technology (IT). Evidence, however suggests that no research has been conducted on EA in the South African private healthcare services industry. As is the case with the financial services sector, South Africa has a well defined highly complex private healthcare services industry with a high reliance on the use of intricate IT systems along its value chain to ensure its sustainability (CMS, 2006). Through the researcher's personal involvement and knowledge of this industry, it is known that a number of legacy systems exist and replacement of these systems, although vital, is a costly and complicated process impacting the company holistically. The results of this research study are expected to enhance the local understanding of EA and the challenges to its evolution in the context of the South African private healthcare services industry.

1.4. Research Problem

This research paper attempts to gain a deeper understanding of the factors that hinder the evolution or implementation of EA in the South African private healthcare services sector.

The research objectives to this research study are:

- **Research objective 1**

Understanding the IT demographics of the major organisations that participate in the private healthcare service industry.

- **Research Objective 2**

To indentify the maturity levels of EA of organisations that participate in the private healthcare service industry, and

- **Research Objective 3**

To understand and identify the possible factors that influence or could potentially influence the implementation or evolution of EA in organisations that participate in the private healthcare service industry.

2. Chapter 2: Literature Review

2.1. Introduction

Enterprise architecture has been described as “descriptive representations” or models that are relevant for describing an enterprise so that it can be produced to management’s requirements (quality) and be maintained over the period of its useful life (change) (Zachman, 1996b). According to Schekkerman (2005, p. 4), “It is about understanding all the different elements which make up the enterprise and how these elements interrelate”. Every organisation has its own specific enterprise architecture, be it complex and rapidly changing or relatively straightforward and stable. Whether or not it is formally documented and understood, it exists (Ross, Weil and Robertson, 2006).

South Africa’s Private Healthcare services industry, being one of the most progressive in the world is, highly dependent on IT (Van Zyl, 2004; CMS, 2006). IT is vital to ensure it remains commercially viable in an increasingly difficult trading environment created by the requirements of the incumbent legislation and governance criteria as determined by the Council for Medical Schemes (Economist Intelligence Unit, 2005). The use of IT in the private healthcare service sector is challenged to find a balance between addressing its users’ business and service needs with its limited resources and limited infrastructure (Stefanou and Revanoglou, 2006).

Non-empirical insights into the concepts of EA, EAMM and the South African private healthcare sector are provided in this chapter. They are addressed through:

- EA, its associated frameworks and developing trends.
- The strategic value of EA in the context of business benefits and its implementation.
- EA in the context of South Africa.
- Maturity Models and their use with EA.
- Provisions of healthcare in South Africa, and the use of EA within this sector globally.

This is of vital importance as it aims to create value by identifying and understanding EA and its associated benefits, as well as the challenges facing EA implementation, specifically in the private healthcare services environment while describing it in a real world context.

2.2. Enterprise Architecture

Well defined EAs provide a clear and comprehensive picture of the enterprises' structure, whether it is an organisation, a functional department or mission area. This structure is defined in models that describe (in both business and technology terms) how the entity operates today and how it intends to operate in the future; it also includes a plan, in the form of an investment road map for transitioning to this future state (GOA, 2003). Such architecture is an essential tool for leveraging IT in the transformation of business and mission operations (GAO, 2003). It is considered crucial to manage and function in a high complexity, dynamic environment. In the context of organisations, it is the organisation that is complex and which is required to undergo regular change (Zachman, 2003). As the complexity increases, the ability to recall all relevant information, as and when, it is

required becomes increasingly challenging. It is therefore logically recommended that information be recorded and stored. When a change is required to the stored information, the starting point to bring about change is to refer to the information that was recorded. CEOs concur that in the context of organisations, the ability to change is their biggest challenge (Zachman, 1996a).

EAs are well defined “*blueprints*” of an organisation that are required for operational and technological change (Zachman, 2003). They offer a comprehensive view of the organisation, with the ability to understand the current and desired operational and technological environment, together with an investment roadmap on how to achieve its objectives (GOA, 2003). The term "enterprise" in the context of "enterprise architecture" is used to denote an entire organisation, encompassing all of its information systems, and or a specific domain within the enterprise. In all instances, the architecture crosses multiple systems, and multiple functional groups within the organisation (Schekkerman, 2006).

An increased focus on quality, timeliness and ability to change are some of the factors that are driving organisations to embrace EA. As technology extends its reach into every facet of the organisation, information practitioners recognise the growing importance of EA to the continued success and growth of the organisation (GAO, 2003). EA has therefore established itself in the IT environment as the organisation’s road-map, assisting it to reach its goals through optimal performance of its business processes. EAs are essential for incorporating and evolving IT systems or solutions in order to allow an organisation to meet its holistic goals (Schekkerman, 2006).

The comprehensive definition of EA used for the purpose of this research paper, is described as follows and illustrated in figure 2.1:

“Enterprise Architecture is a complete expression of the enterprise; a master plan which acts as a collaboration between the 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 enabling technological infrastructure of the business such as computers, operating systems and networks.” (Schekkerman, 2004, p. 4)

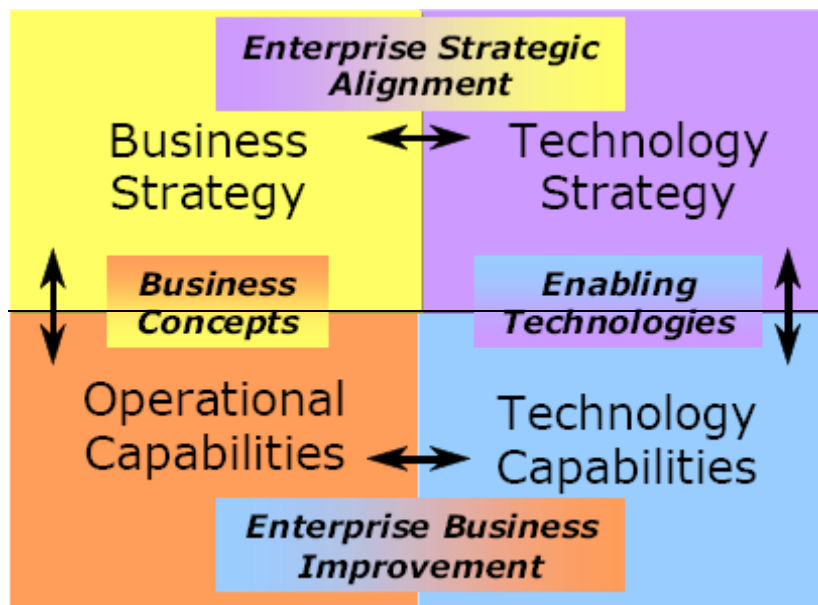


Figure 2.1. Enterprise Architecture dimensions and complexity of the organisation

Source: (Schekkerman, 2004, p. 4).

Harrison and Varveris (2004, p. 1), elaborates on Schekkerman's interpretation of EA, defining it as,

"The capture of all the behaviour that goes on in an organisation; the data that is processed, who does what, where everything is, and why everything is being done. The who, what, why, when and how of the business at every level from high-level corporate goals to the code of low-level programs that implement business processes used to achieve those goals".

Van der Klashorst (2001) further describes EA as,

"Reinforcing and operationalising three competitive weapons: business strategy; digital innovation; and infrastructure development. It is the holistic expression of the enterprise's key business, information, application and technology strategies and their impact on the business functions and processes. It typically consists of current and future state models, namely enterprise business architecture, enterprise information architecture, enterprise application architecture and enterprise wide architecture."

The Author further describes it as,

"As the connective tissue between business strategy, processes, organisation and technology, explicitly defining the role of information technology in realising the business strategy."

Common in these definitions are the vital elements of an EA which have to exist in collaboration, alignment and validation with each other in to create the ability to implement and assess risk. These dimensions are:

- Business Architecture, which depicts crucial business elements such as business processes, service structures, and organisation activities.

- Information Architecture, addresses information elements of EA and data architecture.
- Systems Architecture, which addresses information systems of the organisation.
- Technology architecture, which addresses the technology elements and its structures crucial to establish, maintain and develop information and communication systems (Schekkerman, 2004; Pulkkinen, 2006).

Zachman accommodates a fifth element of EA namely, application architectures (Pulkkinen, 2006). EA also plays a vital role in creating the standards that drive the design of systems that support the business strategy. Business strategists focus mostly on business processes and availability of supportive business requirements, as a result of external business drivers. It, however, cannot be forgotten that the implementation of the business process is facilitated by the company's IT and the capabilities of its IT infrastructure. This is in turn ironically determined by the business leaders (Van der Klashorst, 2001). An IT aligned EA serves to bridge business and IT domains, thereby normalising strategies, processes and information requirements of both. There is, however, not a single representation for a complex product, but rather a set of representations that have to be considered from different perspectives, during the process of production (Zachman, 1996a). This gives rise to the conceptualisation of the Zachman framework, illustrated in figure 2.2, which according to Harison and Varveris (2004) is considered the 'granddaddy' of EA frameworks. It is important to note that an EA framework is distinctly different from EA.

ENTERPRISE ARCHITECTURE - A FRAMEWORK TM













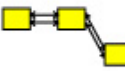

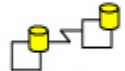















	DATA	What	FUNCTION	How	NETWORK	Where	PEOPLE	Who	TIME	When	MOTIVATION	Why	
SCOPE (CONTEXTUAL)	List of Things Important to the Business 		List of Processes the Business Performs 		List of Locations in which the Business Operates 		List of Organizations Important to the Business 		List of Events/Cycles Significant to the Business 		List of Business Goals/Strategies 		SCOPE (CONTEXTUAL)
Planner	ENTITY = Class of Business Thing		Process = Class of Business Process		Node = Major Business Location		People = Major Organization Unit		Time = Major Business Event/Cycle		Ends/Means = Major Business Goal/Strategy		Planner
BUSINESS MODEL (CONCEPTUAL)	e.g. Semantic Model 		e.g. Business Process Model 		e.g. Business Logistics System 		e.g. Work Flow Model 		e.g. Master Schedule 		e.g. Business Plan 		BUSINESS MODEL (CONCEPTUAL)
Owner	Ent = Business Entity Reln = Business Relationship		Proc = Business Process IO = Business Resources		Node = Business Location Link = Business Linkage		People = Organization Unit Work = Work Product		Time = Business Event Cycle = Business Cycle		End = Business Objective Means = Business Strategy		Owner
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model 		e.g. Application Architecture 		e.g. Distributed System Architecture 		e.g. Human Interface Architecture 		e.g. Processing Structure 		e.g. Business Rule Model 		SYSTEM MODEL (LOGICAL)
Designer	Ent = Data Entity Reln = Data Relationship		Proc = Application Function IO = User Views		Node = IS Function (Processor, Storage, etc.) Link = Line Characteristics		People = Role Work = Deliverable		Time = System Event Cycle = Processing Cycle		End = Structural Assertion Means = Action Assertion		Designer
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 		e.g. System Design 		e.g. Technology Architecture 		e.g. Presentation Architecture 		e.g. Control Structure 		e.g. Rule Design 		TECHNOLOGY MODEL (PHYSICAL)
Builder	Ent = Segment/Table/etc. Reln = Pointer/Key/etc.		Proc = Computer Function IO = Data Elements/Sets		Node = Hardware/Systems Software Link = Line Specifications		People = User Work = Screen Format		Time = Execute Cycle = Component Cycle		End = Condition Means = Action		Builder
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 		e.g. Program 		e.g. Network Architecture 		e.g. Security Architecture 		e.g. Timing Definition 		e.g. Rule Specification 		DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
Sub-Contractor	Ent = Field Reln = Address		Proc = Language Statement IO = Control Block		Node = Address Link = Protocol		People = Identity Work = Job		Time = Interrupt Cycle = Machine Cycle		End = Sub-condition Means = Step		Sub-Contractor
FUNCTIONING ENTERPRISE	e.g. DATA		e.g. FUNCTION		e.g. NETWORK		e.g. ORGANIZATION		e.g. SCHEDULE		e.g. STRATEGY		FUNCTIONING ENTERPRISE

Figure 2.2. A Framework for Enterprise Architecture

(Source: Zachman, 2007)

The Zachman framework has been revised in the context of standards which have been based, *“On the logic classification, structure and semantics of the Zachman Framework, and with the assistance of the foremost authorities in language development: SIL International.”* The revised model is however a licensed product and currently not available in the public domain (Zachman, 2007).

2.2.1. Enterprise Architecture Frameworks

During the mid-1980s, John Zachman, widely recognised as a leader in the field of EA, identified that value and need of using a logical construction blueprint (i.e. architecture) for defining and managing the integration of systems and their components. Zachman (1996a) defined his framework as,

“A simple logical structure of descriptive representations for identifying models that are the basis for designing the enterprise and for building the enterprise's systems”.

Accordingly, Zachman developed a structure or framework for defining and capturing an architecture, which describes six abstracts with which to view an organisation. These abstracts which are shown in figure 2.2 as the columns of the Zachman Framework are:

- “WHAT” (data) the product was made of?
- “HOW” (function) the product worked?
- “WHERE” (network) the components were located relative to one another?
- “WHO” (people) does what, relative to the product?
- “WHEN” (time) do things happen?
- “WHY” (motivation) are various product choice being made? (Zachman, 1996a)

The framework also considers five different perspectives described as rows of the Framework. They are:

- The **scope (contextual)** perspective aimed at the planner (row 1).
- The **business model (conceptual)** perspective aimed at the owner (row 2).
- The **system (logical)** perspective aimed at the designer (row 3).
- The **technology (physical)** perspective aimed at the builder (row 4).

- The **detailed representations (out-of-context)** perspective aimed at the sub-contractor (row 5).
- The **functioning enterprise (organisation)** (Zachman, 1996a; Zachman, 2003).

In doing this, the author was able to identify the type of information needed to portray the EA. The Zachman EA framework being a method neutral framework concerned mostly with content rather than process, is used as a reference by other frameworks. It draws on the discipline of classical architecture, construction and engineering to establish a common vocabulary and set of perspectives, thereby offering a framework for defining and describing complex organisations. This is done in the form of a normalised scheme with one fact in one place, whilst allowing for each of the elements on either dimension of the matrix to be explicitly differentiable. Each cell of the framework has its own way of seeing the organisation architecture (Ylimäki and Halttunen, 2005).

Zachman's framework allows for the identification and description of both the organisation's existing and planned component parts, as well as their common relationships. This is vital to address before the organisation begins the expensive and timeous process of an organisation developing or transforming itself (GAO, 2003). The framework is useful for classifying and organising complex information, optimising the functioning of EA within an organisation through its logical structure which serves to organise the information which describes an EA. EA may, however, exist without the use of a formal framework, and the same framework may be used by a number of other organisations. An organisation may have its own specific framework (Hagan, 2004).

Although many companies use similar EA frameworks, each EA is organisation specific. It involves the proactive, effective planning and deployment of IT resources, to enable timeous and flexible planning, thereby allowing organisations to effectively respond to changes within the business environment (Zachman, 1996a).

2.2.2. Enterprise Architecture Trends

EA in the form of a framework is about understanding all the different elements which make up the enterprise and how these elements interrelate to support the business architecture (Schekkerman, 2005). There should effectively be one business architecture, which describes the business rules by which the business, including its IT, is designed. As illustrated in figure 2.3, this highlights the importance of EA, enforcing the alignment of these activities, with high innovation whilst remaining cost effective. This is done without compromising the company's ability to accommodate market drivers and needs (Kamogawa and Okada, 2005). This is especially important to companies in highly competitive markets with a high rate of change (Schekkerman, 2004).

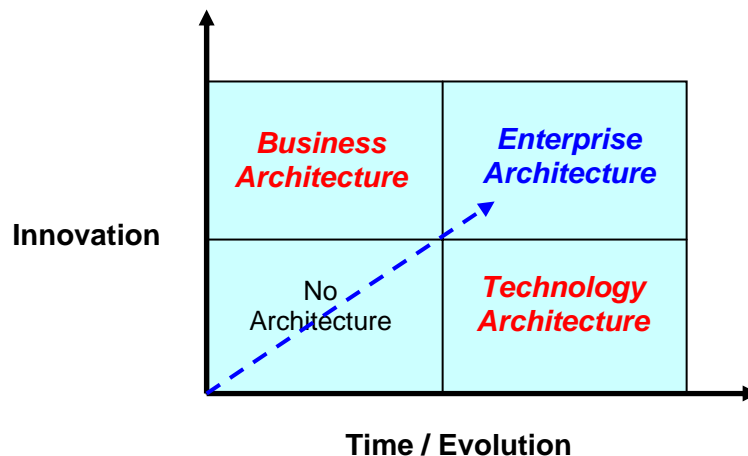


Figure 2.3. Positioning of Enterprise Architecture

(Source: Kamogawa and Okada, 2005).

EA has emerged as a significant business technology trend, specifically in the government sector. It is visible at federal, state and local government levels due to the Clinger-Cohen Act, which requires Federal Agency Chief Information Officers to develop, maintain and facilitate integrated systems architecture (Kamogawa and Okada, 2005). The Clinger-Cohen Act requires agencies to have an IT architecture which with respect to an executive agency, refers to an integrated framework used for developing, maintaining and acquiring IT to enable the agency to achieve its strategic and resource management goals (Matthee, Tobin and Van der Merwe, 2007). The European Union has supported and participated in several initiatives and projects (Bernus, Nemes, Schmidt, 2003). Subsequently different EA frameworks have emerged, such as The Open Group Architecture Framework (TOGAF), used mainly by businesses. This was developed by a business consortium in 1992, and is the one of the many of formal EA frameworks available (Matthee *et al.*, 2007).

2.2.3. Summary

Irrespective of the EA framework used, EA is rapidly being seen as a tool to maintain and / or secure a competitive advantage to the extent that federal government agencies have made the use of EA mandatory. It enables organisations to design, evaluate, and build the right architecture for the organisation in question. Organisations are able to couple business strategy with strategically being able to categorise, analyse, and monitoring information on corporate assets and activity. Organisations are able, through the use of EA, to have a greater capability to respond to change, rapidly sensing and responding by having a well defined description of the business strategy linked to its supportive technology. The improved alignment of technical resources with specific business needs will drive innovative technological solutions.

2.3. Strategic Value of Enterprise Architecture

The importance of enterprise architectures is rapidly becoming a basic ideology of IT management, and its effective implementation is recognised for successful public and private organisations (Bernus *et al.*, 2003). CEOs and senior management understand that exploitation of information and strategy through the optimal use of IT is a vital and indispensable means to achieving business success and securing an indispensable business advantage (The Open Group, 2007). IT has achieved a proven track record in facilitating the delivery of improved operational benefits and improved customer satisfaction. However, unless organisations can ensure architectural flexibility through constantly optimising IT delivery and efficiency, the advantage achieved from IT is of little value to the organisation, resulting in it experiencing a diminishing return with every change of pace in the industry (Varghese and Kurien, 2004).

The competitive advantage achieved with IT can be sustained and augmented through the use of EA. These companies have a better foundation for execution because they have embedded technology in their processes enabling them to reliably and efficiently mobilise the core operations of their company (Ross *et al.*, 2006). EA provides the strategic context for the evolution of the IT systems in response to the constantly changing needs of the business environment. It ensures that the right balance or strategic alignment is achieved between IT efficiency and business innovation. This allows Individual business units to innovate around market needs and drivers in pursuit of a competitive advantage, without compromising an integrated IT strategy, thereby ensuring a synergy exists across the entire extended architecture (The Open Group, 2007).

The strategic alignment, as illustrated in figure 2.4, aims to accentuate the organisation's existing strengths, IT architectural flexibility and IT delivery efficiency (Varghese and Kurien, 2004). Through digitising the core operations of an organisation within the principles of EA, organisations are able to make IT an asset as opposed to a liability, creating a foundation for the required business agility for an ever changing and increasingly competitive trading environment (Ross *et al.*, 2006).

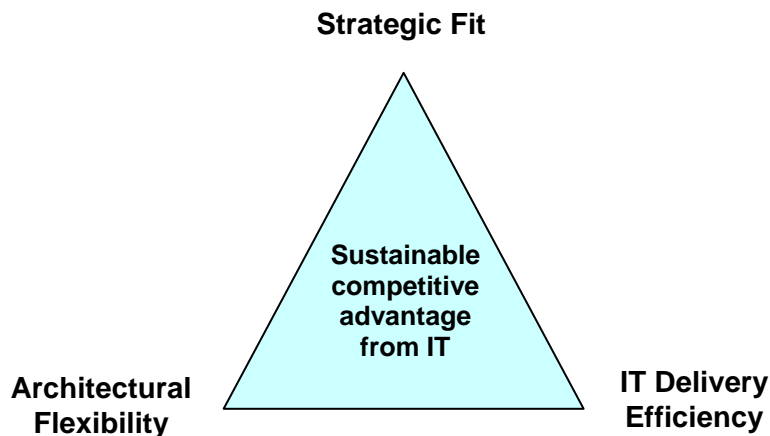


Figure 2.4. Strategic Alignment between Strategy, IT architecture and IT efficiency
(Source: Varghese and Kurien, 2004).

As lifecycles of infrastructural components and individual applications become exponentially shorter, EA become more important as a critical element of strategic alignment (Van der Klashorst, 2001). Failure to achieve this, results in the creation of legacy systems which may place a drag on an organisation's resources. Legacy systems are characterised by the depleting application knowledge, costly maintenance and rigid architecture, with the organisation effectively losing its competitive advantage over time. Through effective use of EA, organisations can stimulate and anticipate change ensuring that IT can always be leveraged (Varghese and Kurien, 2004).

Effective planning and deployment of information and technology resources are active functions characterised in successful global businesses. There are two major thrusts in the new connected economy as creating an increased focus on EA. These are e-Business itself, which drives the need for broad, fast, easy information exchange; and interoperability, which drives innovation and investment. This is a trend of larger organisations moving towards a single, global centralised infrastructure. The effect is improved interoperability and speed of implementation, which in turn helps contain the rising costs of IT infrastructure, driving manageable standards across the entire organisation (Van der Klashorst, 2001). Global businesses with facilities scattered around the world, and even across a country need an intricate field of endeavour with a clear operation structure to not only ensure that the business survives, but also to ensure that it is able to manage the continuous metamorphosis required to make the business thrive throughout its lifespan (Bernus *et al.*, 2003). This is a key characteristic of a mature EA environment (Schekkerman, 2006). These thrusts are further augmented by the following general market dynamics:

- Collapsing business cycle times.
- Dynamic mergers and acquisitions, in search of economies of scale and value.
- e-Business competitors targeting small market niches, using IT as their competitive advantage.
- Advancing software applications and technologies, making existing processes redundant.
- Changing business models through digital innovation and IT.
- The focus on proactive innovation, as opposed to reactive implementation.
- The low comprehension of the IT value proposition, which is then associated with poor application ability (Van der Klashorst, 2001).

Enterprise architecture can clarify interdependencies and relationships between the organisation's business operations and related IT infrastructure. Employed in conjunction with other important IT management controls, EA augments overall performance and optimisation efforts (GOA, 2003).

2.3.1. Business Benefits of EA

The business advantages of effective EA (and its flawless implementation) are visible on the business' bottom line. Through effective EA implementation the organisation becomes a more efficient IT operation as it achieves lower software development and lower associated maintenance costs (Ross *et al.*, 2003). This is coupled with increased portability of applications, easier system and network management, upgrades and exchange of its components and without compromising its flexibility to focus on critical organisation wide issues like security. This in turn secures a better return-on-investment (ROI) for current and future investments through the reduced complexity of the IT infrastructure. Ultimately, this results in reduced procurements costs and efforts, as procurement forms part of the coherent plan (The Open Group, 2007).

EA facilitates the standardisation of an integrated infrastructure. It introduces a process-centred thinking, eliminating disparate processes through seamless integration. In doing this, EA presents two additional benefits, namely, being; improved flexibility and business processes within the organisation and reduced costs relating to maintaining a heterogeneous IT environment (Puschmann and Alt, 2004). Although this is seen as a process to root out old legacy systems, the move towards an enterprise business application is a great challenge.

According to Kamogawa and Okada (2005), EA brings about the beneficial business values sought after by organisations. These are: Business process excellence, with a focus on low cost-consciousness; efficient and productive business operations; customer orientation, with the focus on extraordinary customer service, responsiveness and relationships, based on deep customer information (familiarity) and knowledge (research); Innovation, driven by the need to be first-to-market, with innovative products and services, usually dependant on rapid research and development commercialisation processes; and strategic adaptability in terms of responding rapidly to competitor initiatives and new market penetration opportunities. This is supported by Ross *et al.*, (2006), who indicates that in a survey in which 103 US and European companies were questioned about their IT and IT-enable processes, companies that had digitised their core processes following the principles of EA, experienced higher profitability, quicker time to market and claim to have extracted more value from their IT investments. In addition to this they had lower risk of mission critical systems failure and 80% higher senior management satisfaction with their technology (Varghese and Kurien, 2004). Companies that failed to follow this route, experienced wastage of management time and technology investments that did not support enterprise objectives. Although these companies in instances managed to reduce IT costs, they were not able to extract additional value from their IT systems (Ross *et al.*, 2006).

Additional business benefits encouraging the effective implementation, include tighter alignment of the entire organisation with the business strategy, which is achieved through EA's ability to decompose known business drivers and strategies into a language that can be understood by the IT resources, thereby facilitating the IT investment decisions. Facilitation of knowledge development and sharing is enhanced by forcing collaboration between business and technical leaders, thereby sharing information regarding IT and

business trends. An example of this is assets management, which improves due to the fact that resources are allocated according to a consensus understanding of the business strategic value. Through a formal method of strategic planning or architecting, a reduction in investment decision risks is achieved. EA allows for tighter, leverageable links with strategic vendor (3rd parties) partners due to EA introducing clarity and transparency to partner business relationships. This is further facilitated by business engagement rules becoming more formalised and detailed. In effect, EA makes it possible for an organisation to perform in a constantly changing environment being catalysed by the flow of new information, and detailed market dynamics (Van der Klashorst, 2001).

Traditional businesses are driven by the strategic response to external business influences, such as legislative or statutory regulations infrastructure, which in turn is shaped by the organisation's IT capabilities which in turn are determined by its existing IT (Van der Klashorst, 2001). This is very prevalent in companies that partake in the health and financial service industries. They are faced with different laws and regulations in different components of their value chains (Ross *et al.*, 2006). Changing regulations mean massive expenditures with little or no added value, however, companies with the correct EA foundation are able to seamlessly comply to regulations as it is easier for them to identify the component that needs be changed and what the knock-on effect of these changes are (Ross *et al.*, 2006). The IT service domain requires the business processes and information consumption needs are made clear in order to deliver on the required IT based products and services. The organisation's IT architecture links the business and IT service management domains by accommodating the strategy, process and informational requirements into a holistic strategy. As a result of this process, management of the EA domain is the joint responsibility of business and IT leaders (Van der Klashorst, 2001).

2.3.2. Implementation of Enterprise Architecture

An effective foundation for the implementation of EA depends on the alignment between IT capabilities and business objectives. Areas in which this process goes wrong are due to strategy not always being clear enough or understood to act upon. Where it is understood, the implementation is sequential, resulting in a number of IT solutions using different technologies. Finally, the EA implementation results will be error prone if the information required to implement EA is maintained in organisational silos (Ross *et al.*, 2006).

EA implementation and its maturation process must take the economic aspect into consideration, both at technical and economic levels. The techno-evaluation should consider the:

- Cost of the solution (ROI).
- The performance measures of the solution, and
- The relationship between the cost of the solution and the allocated budget (Bernus *et al.*, 2003).

Further to this, a correct strategic foundation, understanding the current business processes is critical, supported by the mapping out important processes and technology. This allows for the required levels of integration and standardisation (Ross *et al.*, 2006). Puschmann and Alt (2004) concur, stating that factors to be considered in establishing an EA are software capabilities; financial capabilities; internal drivers and external factors. It is vital that companies create and communicate a business case for IT investments, assessing the ROI, building that case of the expected long terms cost reductions. It vital that organisations implementing EA understand that this is process implemented over a period of time, requiring specialised resources knowledgeable in EA and its principles as well as the internal company processes (Schekkerman, 2006; Schekkerman, 2005). This impacts on the ROI calculations. Failure to do this successfully leads to the creation of

doubt or a negative perception of the value of architecture initiatives, being deemed as another “IT Ivory tower’ (Ross, *et al.*, 2006). Schekkerman (2005) and The Open Group (2007) augments this by indicating that although the benefits are clearly understood, measurement of value remains challenging.

The models used for the implementation of EA may be standard or configured for the use by an individual enterprise. They may be developed in-house or outsourced to a third party according to the relative organisation’s requirements (Bernus *et al.*, 2003). Irrespective of the route taken, it is recommended that due to the high strategic importance associated with EA, the ultimate responsibility for its implementation should rest with the board of the organisation (Schekkerman, 2005).

2.3.3. Summary

Business process excellence; customer orientation; innovation and strategic adaptability in a constantly changing environment being catalysed by the flow of new information, seem to be the key requirements to achieve commercial viability in an increasingly regulated and competitive private healthcare services industry. Companies with the correct EA foundation are able to seamlessly comply to regulations and market dynamics, as they are able to identify the components that needs be changed, whilst not being ignorant to the knock-on effects.

By implementing EA, a number of company objectives are met, with the most significant being; IT responsiveness; risk management; senior and business unit management satisfaction; and support and ultimately the achievement of strategic business outcomes. Its implementation however faces a multitude of challenges prior to its true value being realised. Prior to the implementation of EA, a cost and return on investment (ROI)

assessment needs to be conducted and understood by executive business management. This can be supported by the required EA measurement outcomes necessary to ensure that the proposed ROI has been realised.

2.4. Enterprise Architecture in South Africa

Enterprise Architecture in South Africa, has been addressed by Matthee *et al.* (2007), Van der Klashorst (2001) and Schekkerman (2005). In the third electronic survey executed by the Institute for Enterprise Architecture Developments, which seeks to understand EA usage and implementations world-wide, South Africa was ranked number 10 out of 149 countries surveyed, based on 219 721 registered survey downloads with regards to EA activity (Schekkerman, 2005). The survey indicated that the most common uses of EA were supporting decision making, managing an effective IT portfolio and delivering road maps for change (Schekkerman, 2005). Alignment of business and IT was identified as the greatest reason to initiate the EA process, a view supported by Van der Klashorst (2001). Schekkerman (2005) revealed that 5% of total global EA activity was taking place in Africa, while 7% of all global activity was focused on Healthcare.

In the context of the South African financial services industry, EA is a strategic tool not only adopted by larger corporates but also by smaller companies, with its adoption not linked to the company's size (Matthee *et al.*, 2007). It is a vital support tool for business and IT alignment required for guiding the renewal of applications and infrastructure, legacy transformation, business change as well as merges and acquisitions. This is of vital importance as change and transformation on all levels are becoming imperative to due increase in global competition, and the uncertainty of the global business environment

(Van der Klashorst, 2001). This is in alignment with international trends (Matthee *et al.*, 2007).

Although EA enjoys an increased awareness and growing importance, not all organisations are the same maturity level with regards to EA management. This is evident through senior management involvement in EA. EA governance forms part of the organisational governance, supported by top management. However, the associated responsibilities remain with the Chief Information Officer (CIO) or the Chief Technology Office (CTO) and not the CEO. This suggests a low EA maturity environment, as opposed to international trends in which EA responsibility is held by the board. A result of this is that the value of EA is not always quantifiable and understood (Matthee *et al.*, 2007).

The most common EA frameworks, in the South African context, included the organisation's own framework; TOGAF, the Open Group Architecture Framework and the Zachman framework. Unlike international trends where organisations have their own enterprise architects, enterprise architects in the South African context are still in the study of EA (Matthee *et al.*, 2007).

South African financial service sector companies indentified the establishment of a comprehensive set of architectural principles to guide inform and support the way in which the organisation achieves its mission through the use of IT and the adoption of an architectural compliance strategy, as a critical success factor for the implementation of EA (Matthee *et al.*, 2007). This view is supported by Zachman (1996a), at a broader context.

2.4.1. Summary

EA in South Africa, is driven by similar business and environmental catalysts as is the case with EA in an international setting (with the exception of government requirements related to the use of EA). The resultant effect is that if EA is implemented against the same set of standards, the respective companies will benefit from EA, as have their international counterparts. To quantify the value add of EA, remains a challenge. This is in alignment with international trends. Although there is a high level of executive management involvement in the EA processes, unlike international trends, the respective companies' boards remain at an arm's length from EA and its implementation, still viewing it at the responsibility of the most senior IT person of the organisation. This does not negate the fact that a high level of business and technology strategy alignment and executive management involvement exists indicating a positive contribution to the maturity levels of EA in South Africa. The concern, however, remains that EA resources are not freely available as permanent resources, with local organisations either using contractors or developing staff without formal EA qualification into EA related positions,

2.5. Capability Maturity Models and Enterprise Architecture

IT delivery capabilities of an organisation are those associated with the ability to develop and maintain IT applications and infrastructure. Lack of maturity in the in IT industry usually manifests in poor application development within delayed schedules, overspent budget and compromised quality (Crosby, 1996) To enhance IT efficiencies, the organisation should embark on a process improvement initiative with the primary goal of improving predictability, control and efficiency. Capability maturity models provide the pathway for the organisation to follow. Merely aligning IT investments with the business strategy is not sufficient (GAO, 2003). With regards to EA, the organisation needs to

ensure that their EA is flexible, that the process implemented is not a once-off process, but rather a continuous process of synchronisation. This allows the organisation to focus on building IT capability and flexibility, as opposed to reacting to disruptive technologies and discontinuities (Varghese and Kurien, 2004).

2.5.1. Maturity Models

The use of maturity models has its origins in quality management with its focus on a process improvement approach to software engineering, originally developed by the Software Engineering Institute (SEI) at Carnegie-Mellon University (Tiku, Azarian and Pecht, 2007). It achieved this by indentifying and reviewing the essential elements required to manage effective processes. It was first used by the United States air force in the late eighties, followed by an extensive uptake by government departments and contractors to government departments (The Open Group, 2007). Its usage increased specifically in industry sectors and organisation that were faced with mission critical projects. An example of this was the avionic software industry (Crosby, 1996). Maturity models introduced the concept in which organisations, specifically with software development expertise integrated lessons learnt into the existing processes, changing their focus from results of software development to ensuring an improvement in the processes used. The end result was that the use of maturity models and associated methodologies assisted organisations to eliminate flawed outcomes by indentifying and removing flawed processes (The Open Group, 2007).

Applied to improving software development, maturity assessments are based on five maturity levels that encourage discipline in the development processes, and predict an organisations capability to successfully develop software based on process discipline. According to Crosby (1996), the quality management maturity grid describes the typical

behaviour of a company as it evolves through the five phases of maturity that predict an organisations capability to successfully develop software based on process discipline. The maturity levels are frameworks to encourage discipline in the development process in order to reach a stage of quality management excellence. It serves to formalise a chaotic and disorganised process. It emphasises well-defined processes, goals, and practices as a way to turn software production into a successful, repeatable endeavour by encouraging discipline in the development process (SEI, 2003). The five phases of maturity include:

1. Uncertainty.
2. Regression.
3. Awakening.
4. Enlightenment.
5. Certainty (Crosby, 1996).

Capability Maturity Models (CMMs), which derive their nomenclature from the Software Engineering Institute (SEI), is used by best-in-class companies by providing an effective and proven method for an organisation to gain the desired control over its IT related development and related processes. CMMs provide the following benefits:

- A description of practices that an organisation must perform in order to improve on its processes.
- A benchmark against which the organisation can periodically measure itself in order to gauge its improvement.
- A proven framework within which to manage the improvement efforts (The Open Group, 2007).

Maturity models have subsequently been proposed for a number of other activities, ranging from software development to supplier relationships (Tiku *et al.*, 2007). Organisations that can manage change effectively are generally more successful than those that cannot. Many organisations know that they need to improve their IT related development processes in order to successfully manage change, but don't know how.

These organisations typically either under or over spend on process improvement because they are unsure how best to proceed, in some extremes, working on a number of parallel unfocussed efforts to little or no avail (The Open Group, 2007). Although the models have proven track record the challenges related to CMM, originates from companies that which to bring about improvement process across a number of disciplines. The discipline specific nature if CMMs has, however, limited its flexibility to address this need. The CMM intergration program was introduced to address this limitation by sourcing elements from a number of existing CMMs, thereby yielding a single CMM that could be used across the organisation. This led to the establishment of CMMI (SEI, 2003). The CMMI maturity levels can be categorised as follows

1. Initial.
2. Managed.
3. Defined.
4. Quantitatively Managed.
5. Optimising (SEI, 2003).

Tiku *et al.* (2007), suggest that in applying maturity models, evidence is sought and judgments are made relating to:

- Commitment to perform (leadership, resources).
- Ability to perform (experience, training and tools).

- Methodology used (logic framework, planning).
- What has been performed (task activities).
- How are the end results of the product performance used (integration at organisational level)?

“Assessment” is the practice of an organisation evaluating itself against a model, and it serves to determine the level of maturity at which the organisation is performing. It then allows the organisation to assess whether it chooses to progress to the next level of maturity and if so which criteria it needs to fulfil to achieve its desired goal and achieve its ideal ROI. The benefits of CMMIs in the IT environment are well documented (The Open Group, 2007). As the company progresses through the various levels of the maturity model, it is recommended they stabilise at a given maturity level before advancing. Because each level builds upon the foundation of the previous level, skipping levels can be counterproductive. It is also recommended that for the organisation to achieve optimal performance, it should strive to have all elements of the maturity model at the same maturity level (GAO, 2003).

2.5.2. Enterprise Architecture Maturity Models

The application of CMMIs in the EA environment is becoming more prevalent due to the increased interest in EA combined with the lack of maturity in this discipline. Most organisations do not proactively create an EA. Their high-level structure that connects business and IT is historically grown as an ‘automatic’ result of many different IT programs. This results in a structure that is inflexible, non-transparent and difficult to maintain, creating a business-IT misalignment EA being an IT discipline itself does not provide benefits; only the intelligent use of EA models by the people in the organisation produces benefits (The Open Group, 2007).

For EAs to be useful and provide business value, their development, maintenance, and implementation should be managed effectively and supported by tools. It is of vital importance to have a process to define, maintain and implement EAs through disciplined and rigorous approach to EA life cycle management. Significant EA program management areas include (Schekkerman, 2006):

- Suggested organisational structure and management controls.
- Development of a baseline and target architecture.
- Development of a transition plan.

Maturity models which have been accepted by both government and private institutions and with regards to the EA field of interest offers a series of template tools which will assist an organisation to assess:

- The state-of-the-art IT architecture process.
- The IT architecture.
- The organisations buy-in into both (SEI, 2003).

EA is a linear process that evolves over a period of time and which requires management and operational discipline to organise and embrace business and technology components to assist the organisation in achieving its desired goals. Although a number of firms have applied EA for over a decade, EA effectiveness remains uncertain. A flexible, dynamic extended EA enables the enterprise to change and manage the complexities inherent in large enterprises. EA brings an operating discipline to the organisation defining the process from strategic intent to the execution of its capabilities that will enable the organisation to meet its intent. These capabilities include both business and technology

components (Kamogawa and Okada, 2005). Prior to investigating the challenges to the implementation and evolution of EA within an industry, it is of a vital importance to understand the maturity level, if any, of the EA within the organisation being investigated. By effectively describing the elements of an effective EA management program, maturity models provide a benchmarking tool for judging an enterprise's architecture at any given point in time (GOA, 2003). The Institute for Enterprise Architecture development's (IFEAD) extended EAMM, which will be used for the purposes of this research study, provides a path to identify EA maturity levels within and organisation as well as the EA and procedural improvements required to evolve to the next level of maturity (Schekkerman, 2006). It provides the methodology for EA and procedural improvements within an organisation. As the EA matures, predictability, process controls and effectiveness also increases. The scale for the EAMM can be categorised as

1. No Architecture Development.
2. Initiated.
3. Under development.
4. Managed.
5. Optimised (Schekkerman, 2006).

This is crucial to the development of the EA because it provides the rules and definition necessary for the integration of information and services at an operational level across organisational boundaries. At its fullest maturity, EA becomes an extended-enterprise concept and prescribes the infrastructure for extended-enterprise businesses and provides the conditions and structures for allowing information to flow from organisation to organisation (Schekkerman, 2006).

An EAMM provides a scale or metric for describing the status on effectiveness of the business in evolving itself with regards to EA. It also plays a significant role in assessing the steps required by the organisation to achieve the next level of maturity (Scheckerman, 2006).

In maturing EA within an organisation it is important to understand that the company should focus on small improvements as opposed to skipping steps to avoid failures or delayed benefits. Ross *et al.* (2006) further adds that architecture capability should be brought in-house because a close working relationship between IT and business is a non-negotiable for the effective maturation of EA.

2.5.3. Summary

As companies transition through the architecture maturity stages, they fundamentally change how they conduct business. They move from implementing IT-enabled processes with little regard to business synergies to a level of maturity in which these processes have become a core discipline within the organisation. Maturation of EA within an organisation is a journey, which some companies fail at and which others do not choose to continue. Understanding the maturity of EA within an organisation enables understanding of the business objectives, funding priorities, management capabilities to extract value from IT capabilities, governance issues and management's abilities to define required applications. The goal of an organisation is not to achieve a particular end state but rather to ensure that their current maturity level addresses the organisation's objectives, allowing it to maximise value from its IT investments and implement the required process discipline. In achieving the most appropriate maturity level companies establish links between the core processes. Companies need to be focused on eliminating silos that limit business agility and efficiency.

2.6. Provision of Healthcare

Healthcare encompasses a wide variety of services, ranging from clean water and sanitation to cosmetic surgery and organ transplants. In economic terms healthcare provision can be categorised into three categories; public healthcare, merit healthcare and privately funded healthcare delivery.

According to economic theory, it is socially viable for governments to finance and provide the first two types of services, where as private healthcare services has been based on the widespread and uncritical belief that a free market is the best mechanism for the creation and financing of this offering (Hsiao, 1995).

2.6.1. Theory of Public Goods and the Provision of Private Healthcare

Public goods as per the definition of economic theory are defined as *“A good that, once produced, can be consumed by an additional consumer at no additional cost”* (Holcombe, 1997, p. 1). They are further categorised by the fact that consumers cannot be excluded from consuming the good once it has been produced (Holcombe, 1997). Most of the public health service and preventative measures are seen as public goods.

Another component of public funded health services are merit goods which are services whose consumption produces greater social benefit than private benefit. This would include family planning, certain primary-care services, trauma services, and basic health services to assist the vulnerable and the destitute. Individuals making use of these services would be powerless to pursue private healthcare (Hsiao, 1995).

The economic theory, however, makes a flawed assumption that public goods are either under produced or not produced in the private sector. Healthcare services are successfully produced in the private sector (Holcombe, 1997). Private goods, in contrast to public goods, are exclusive benefits available to individuals that create demand and are able to pay for it. Once these services have been consumed, they can not be consumed by another person. This supports free market principles that allows the market to produce and distribute efficiently. The free market is characterised by the constant flow of information about consumers' preferences, their judgment about the quality of products, and the production costs of individual firms. A significant portion of curative medical services and medication fall into this category (Hsiao, 1995).

Reforms related to healthcare systems face the fundamentals of assessing the best way to structure the healthcare sector. Polar view points and infrastructure exist, being central planning and the free market. Central planning is based on the belief that a government is able to provide welfare services to patients while managing the process efficiently, whereas the free market relies on the view that the consumer can make informed and rational choices and this market will best satisfy individual wants and optimise efficiency (Hsiao, 1995). The availability of private healthcare became more prevalent in the United States after the Second World War, which led to freedom of customer choice whereas in countries that offered healthcare services as a social welfare offering emphasised accessibility and appropriateness of the related care were emphasised (Porter, 2003).

Paying for healthcare is challenging in that "spend" on healthcare needs to be controlled so as not to affect the delivery of other national needs. Finding this balance has been achieved through the establishment of private companies that spread the risk of medical

costs across a large group of people (World Bank, 2006). Reasons cited for the preference to private healthcare include:

- Better and more flexible access.
- Shorter waiting periods.
- Greater confidentiality.
- Greater sensitivity to the patient's needs.
- Increased competition amongst healthcare providers in the private sector, resulting in increased consumer choice (Zwi, Brugha and Smith, 2001).

Free healthcare at the delivery of service, i.e. Public Healthcare have increasingly taken a substantial portion of GDP without significant improvements in service outcomes. In private healthcare, patients have access to a maximum choice of healthcare providers, whose services come at a price, financial excluding a large portion of the population (Adema and Einerhand, 1998). In addition to the above factors, in many countries the future of social welfare was placed under scrutiny as it relates to the feasibility of maintaining a welfare state that could continue to provide for individuals with specific needs. This, together with a social spending overload, increased the emphasis of the private sector in playing a significant role in providing social welfare benefits, amongst which included the delivery of healthcare (Adema and Einerhand, 1998). The magnitude of private health care can therefore be partly related to the limited coverage of public provisions. Stimulated by fiscal measures, employers are still encouraged to provide healthcare coverage for their employees in the form of an employee benefit.

2.6.2. Provision of Healthcare in South Africa

Healthcare delivery remains both a political, financial and emotional agenda topping country agenda lists, with the major issues in healthcare delivery today being the need to find successful solutions to the financing and delivery of medical care. South Africa at present has a dual healthcare system consisting of public and private health care financing. In 2005, total healthcare spend equated to 8.1% of GDP, with private healthcare contributing 4.6% (Health Systems Trust. 2005)

South Africa's private healthcare sector which is financed by users of medical schemes is described as state-of-the-art and thought to be of high quality (Economist Intelligence Unit, 2005). The number of privately insured beneficiaries increased according to the latest Council for Medical Schemes Annual report 2005/06 by 2.6% to 6.8 million beneficiaries (CMS, 2006). A total of R52.2 billion in contributions were collected with R45.8 billion paid out in claims. This equates to an increase in paid claims by 12.2% from the previous year.

In addition, total non-healthcare fees of which R5.4 billion was dedicated to administration fees (made up of a large IT component) rose by 9.6% to R7.8 billion. This resulted in a total operating deficit of R365.2 million for private healthcare funders (CMS, 2006). In order to stretch the healthcare rand, private healthcare funders are making increasing use of IT to facilitate creative healthcare benefit designs, making South Africa one of the most complex environments, (facilitated or driven by IT), as it relates to the funding of private healthcare. This is further being challenged by the already implemented Prescribed Minimum Benefits (PMB) and government's incumbent low-cost medical scheme structure which is aimed to be managed and administered by private healthcare sector infrastructure. This calls for an ever increasing efficient operating and IT environment. In

simplistic terms, the value chain of private healthcare delivery is made up of (Thomas, 2006):

- The providers of healthcare.
- The enablers of electronic claim submission, being practice management systems (PMS), electronic switches and pharmacy benefit managers.
- The administrators and funders of Healthcare, being Medical Scheme administrators and Medical Schemes.

Both electronic benefit managers and Medical Scheme administrators are responsible for managing the complexity of the benefit design and are high IT intensive environments, with the electronic benefit managers considered to be full IT shops. These Healthcare institutions are complex multi-functional, information intensive organisations that require sophisticated integrated clinical and business management information systems. In countries such as Canada and Greece, this has been facilitated by the integration of enterprise resource planning (ERP) with existing systems which in itself created an entire EA implementation market that radically transformed systems (Stefanou and Revanoglou, 2006). Locally, Healthcare providers, specifically in the medicine delivery market are increasingly more reliant on IT systems to remain commercially viable, with the listed groups following a similar strategy to drive efficiencies and alignment within their organisation.

2.6.3. Summary

Substantive but elusive components of the increase in healthcare costs are the increased administrative overheads and redundancies which can be addressed through strategic planning and effective implementation of the appropriate IT solution. The management

of this cost could be the difference between making a profit or a loss, and could be addressed through the design, implementation and use of an appropriate EA.

2.7. Enterprise Architecture in the Healthcare industry

Traditionally, a healthcare organisation's ability to embrace system-wide change or new initiatives is challenging. Specialised units within healthcare organisations have been referred to as silos that are resistant to change (Mercer, 2001). In addition to the financial factors mentioned in section 2.6.2, the global forces driving the development of integrated systems in the healthcare sectors were noted as the following:

- Populations in industrialised countries are ageing, which in turn will be associated with the increased costs of managing them.
- Fragmentation of healthcare systems.
- Determinants of health.
- Improved technology for patient care.
- Economies unable to support the current and increasing proportion of GDP allocated to healthcare.
- No proven benefits of IT in healthcare services.
- New technologies altering traditional healthcare delivery services.
- The notion of health systems being redefined (Mercer, 2001).

These are all creating tremendous financial challenges to the provision of affordable private healthcare services. The introduction and maturation of technology into the healthcare delivery environment is therefore crucial. Current IT Healthcare systems are

challenged to accommodate the current market pressures and drivers due to not having the appropriate IT infrastructure in place (Stefanou and Revanoglou, 2006).

The IT needs of the healthcare systems are not dissimilar to the needs of businesses in other sectors of the economy, which are being revolutionised globally through the increased use of IT, in the form of increasingly more powerful computing and communication systems (Mercer, 2001). This approach would address the concerns raised by Jaffe *et al.* (2006) regarding the unsustainable costs of healthcare funding. A large growing component of this increased cost is due to administrative overheads and redundancies that could be reduced with better strategic planning, tactical implementation and information technologies. However, the most significant barriers to successful implementation of IT in the healthcare sector at a global level are identified as:

- Lack of adequate financial support.
- Poor understanding of healthcare provider and funder client needs by software vendors.
- Absence of solid cost-benefit analysis related to IT results in under invested environment and subsequently a lack of developed systems. Healthcare organisations are generally risk adverse and will not invest in IT systems unless there is a proven return.
- Lack of a strategic planning and lack of IT leadership in terms of implementation.
- Lack of an industry wide homogenous data recording and standards.
- Rapid obsolescence.
- Implementation time.
- Difficulty in providing adequate training to end users.
- Difficulty of recruiting and retraining qualified staff (Mercer, 2001).

Mercer (2001) also revealed that the increasing importance of IT in healthcare was resulting in CEOs becoming actively involved in the decision making process with respect to IT budgets.

2.7.1. Summary

IT and EA are not only strategic elements of private healthcare delivery but they are also manageable components that can be addressed through proven application utilisation and process implementation. Yet the implementation of IT has been identified as a barrier. This needs to be addressed through reviewing the utilisation of current systems, application and processes, and through creating an understanding at business level of the added value of EA introduces, thereby creating a better understanding of the advantages of IT investments. Various instruments include, *inter alia*, EA frameworks, and EAMMs.

3. Chapter 3: Research Questions

3.1. Introduction

Chapter 2 provided an extensive non-empirical body of information that addressed EA and its associated strategic value both globally and in the context of South Africa, as well as its synergy with capability maturity models. It started to create an understanding of the business environment of South Africa's private healthcare services industry in order to assess the potential challenges associated with implementing or evolving EA in that industry. In order to understand the challenges facing the selected industry with regards to the implementation on EA, the various elements that make up an enterprise and how these elements interrelate need to be understood and analysed.

3.2. Research Objective

The objective of this research is to investigate and gain an understanding of the EA maturity levels, as well as the factors both internal and external that influence the implementation and evolution of EA, with the context of the private healthcare services market in South Africa. EA is an iterative, maturing discipline that provides management the operating discipline for organising and engaging business and technology components to fulfil the mission of the organisation. Although there is significant research done on Enterprise Architecture, limited research has been conducted in the context of South Africa, specifically in the context of the South African private healthcare service industry. Puschmann and Alt (2004), suggests that when a company is considering the implementation of EA, it should consider a number of factors. These

include the company's internal elements, external factors, its software capabilities, and financial considerations. These will serve as a basis for some of the research questions.

Schekkerman

The main research question to be asked is, "What are the challenges faced by companies participating in the South African private healthcare industry with regards to the implementation and evolution of its EA?" In order to do so, the following sub-questions in the context of the South African private healthcare service industry are proposed to satisfy the needs of this research paper.

3.3. Research Questions

The following research questions are proposed to address the objectives outlined above:

Research Question 1: What are the vital IT demographics of the respondent companies and relating to senior management involvement and associated processes?

Research Question 2: What is the EA maturity level within the targeted organisations?

Research Question 3: What are the internal company elements that influence or could potentially influence the implementation or evolution of an EA in the South African private healthcare services industry?

Research Question 4: What are the software capabilities within the organisation that influence or could potentially influence the implementation or evolution of an EA?



Research Question 5: What are the external factors that influence or could potentially influence the implementation or evolution of an EA?

Research Question 6: What are the financial considerations that need to be considered in the implementation or evolution of an EA?

4. Chapter 4: Research Methodology

4.1. Introduction

This research assessed the EA maturity levels of the major organisations that participate in the private healthcare service industry. It further explored the challenges faced by these organisations in implementing the principles of EA and evolving it to the next level of maturity. The factors identified in the literature review in Chapter 2, were software capabilities; financial capabilities; internal drivers and external factors (Puschmann and Alt, 2004). Chapter 3, outlined the research objective and questions that have guided this research paper. Chapter 4 provides a description of the methodology used to conduct the proposed research. Through the terms defined by Merriam (1997), this research project sought to analyse and explain the collected data through a combination of both qualitative and quantitative methods.

This chapter is presented in three main sections, being the research philosophy (4.2), researches approach (4.3) and the research design (4.4). Each section will present a brief motivation for the choices made in compiling the research methodology of this research project.

4.2. Research Philosophy

Research is based in on an underlying assumption about what constitutes valid research, and which research methods are appropriate. The philosophical origins of qualitative design are linked to phenomenology and symbolic interaction, whereas positivism is

commonly linked to quantitative designs. In the instance of positivism, reality is stable, measurable and observable, in which knowledge, which is gained through experimental research, is quantifiable, and testable through the use of hypothesis (Merriam, 1997). According to Hussey and Hussey (1997), phenomenology is the science of ‘phenomena’, which in turn is a fact or occurrence that is perceived. This research philosophy was concerned with the research participant’s frame of reference. This research project contained a quantitative element which was used to assess the IT related demographics as well as EA maturity levels of respective organisations, and a qualitative element which served to create an understanding of the challenges to the implementation and evolution of EA in the private healthcare services sector. Hussey and Hussey (1997) in table 4.1 offers key features of both a positivistic and phenomenological philosophy paradigms.

Positivistic Philosophy Paradigms	Phenomenological Philosophy Paradigms
<ul style="list-style-type: none"> • Produces quantitative data • Large samples required • Used for hypothesis testing • Data is highly specific and precise • Location is artificial • Reliability is high • Validity is low • Generalises from sample to population 	<ul style="list-style-type: none"> • Produces qualitative data • Small samples are useable • Used to generate theories • Data is rich and subjective • The location is natural • Reliability is low • Validity is high • Generalises from one setting to another

Table 4.1. Research Philosophy Paradigms

(Source: Hussey and Hussey, 1997)

According to Hussey and Hussey (1997), in certain instances a phenomenological philosophical paradigm may be used to produce quantitative data, and *vice versa*. Given the purpose of this research as outlined in chapter 1, and for the reasons listed below, a phenomenological philosophy paradigm was used to derive the required data.

- A small sample was used. The research data was compiled from twelve company respondents.
- The location of the research was natural. It was conducted at the offices of the respondents, and not in a scientific environment.
- The research collected was not used to test a hypothesis. It served to create an understanding of the research problem at hand.
- The data collected for the purpose of this research was both quantitative and qualitative (largest portion of the collected data). The quantitative data collected from section two of the interview questionnaire was substantiated by qualitative data, as respondents felt obliged to justify their responses.
- The validity of the research was high as the findings of the research accurately represented what really happened in the context of the industry being investigated.

4.3. Research Approach

As there are various philosophical paradigms to research, various research approaches exist. This research project utilised both non-empirical (literature review) and empirical research approaches. The non-empirical approach was used to prepare for and structure the empirical research activities (Hussey and Hussey, 1997). Chapter 2 indicated that although there is significant research done on EA, limited research has been conducted in the context of South Africa, specifically in the context of the South African private healthcare service industry. The view was taken that the South African context needed to be investigated and researched in isolation due to South Africa being a developing country with its own set of challenges (Mathee, *et al.*, 2007). The empirical level of the research project aimed at creating an understanding of the challenges faced by companies in the

South African private healthcare service industry with regards to the implementation or evolution of an IT aligned EA.

Based on the research problem and the nature of the research project, the empirical approach was applied and exploratory in nature. It was applied in nature as it was undertaken to answer questions about a specific challenge to the implementation and evolution of EA in the private healthcare services industry. It was exploratory in nature as it served to clarify and define the nature of the problem (Zikmund, 2003). Hussey and Hussey (1997) concurs with this approach indicating that exploratory research is ideal to collect empirical evidence on a research problem that very few or no earlier studies have been conducted, and when insights and familiarity is required on a specific topic, which is the case of this research project. Exploratory research serves to capture patterns, ideas or potential hypothesis to test. It is not used to confirm or test a hypothesis (Hussey and Hussey, 1997).

4.3.1. Qualitative vs. Quantitative

A further distinction between research approaches is the classification between qualitative and quantitative research approaches. The research approach undertaken for this research project consisted of both quantitative and qualitative elements in order to answer the research questions posed in Chapter 3.

Marshall and Rossman (2006) suggest broadly three reasons to combine qualitative and quantitative approaches:

1. To enable confirmation or corroboration of each other via triangulation.
2. To assisting in providing a deeper understanding.
3. To develop new lines of thinking, providing fresh insight.

The reason for the use of a quantitative approach with qualitative results is best described by Miles and Huberman (1994) citing Siber (1973), stating that quantitative methodologies help with the qualitative side by finding a representative sample. It also provides the background data, assisting in validating and interpreting qualitative results with quantitative findings, thereby assisting in the better understanding of the data collected. Merriam (1997) presents the features of the two research approaches in table 4.2.

Point of comparison	Qualitative Approach	Quantitative Approach
Focus of Research	Quality (Nature, essence)	Quantity (how much, how many)
Philosophical roots	Phenomenology, symbolic Interactionism	Positivism, Logical empiricism
Goal of Investigation	Understanding, description, discovery, meaning, hypothesis generating	Prediction, control, description, confirmation, hypothesis testing
Sample	Small, non-random, purposeful, theoretical	Large, random, representative
Data collection	Researcher is the primary instrument, interviews, observations, documents	Inanimate instruments (scales, tests, surveys, questionnaires, computers)
Modes of analysis	Inductive (by researcher)	Deductive (by statistical methods)
Mode of findings	Comprehensive, holistic, expansive, richly descriptive	Precise, numerical

Table 4.2. Characteristics of Qualitative and Quantitative research

(Source: Merriam (1997))

Quantitative approach was utilised to determine the quantity or extent of some phenomenon in the form of numbers, whereas the qualitative approach provided a greater understanding of the concept, crystallising the problem as opposed to providing an exact measurement. The qualitative approach described a trend, with the absence of a rigorous mathematical analysis. Instead the emphasis was placed on words, observations, characterisations and other expressive descriptions (Zikmund, 2003).

4.3.1.1. Qualitative Research

Given the nature of research questions 3-6, listed in chapter 3 a qualitative research methodology was used. It focused on meaningful interpretations and other expressive descriptions that clarified the qualities or characteristics associated with the challenges being investigated. It was designed to uncover important variables in the field of EA in the industry being investigated to then to possibly develop hypothesis for future studies (Zikmund, 2003).

Both Merriam (1997) and Hussey and Hussey (1997) concur that qualitative research itself has a number of orientations, being: basic or generic (qualitative studies that do not focus on culture or build a grounded theory); ethnography (a form of qualitative research employed by anthropologists to study human society and culture); phenomenology (underpins all qualitative research, with the emphasis being placed on the essence of structure of the experience or phenomenon); grounded theory (it assumes an inductive stance, and strives to derive meaning from the data, with an emphasis on theory development, and case studies (employed to gain in-depth understanding of a situation and meaning for all the participants, focused on discovery as opposed to confirmation).

Given the nature of the research problem outlined in chapter 1, it was concluded that basic or generic qualitative methods would be the most appropriate for addressing research questions 2-5 outlined in Chapter 3. The basic or generic qualitative research sought to indentify and understand a phenomenon, a process or the perspectives and worldviews of the respondents. Data collected through interviews was analysed to identify recurring patterns in the form of categories, factors, variables or themes (Merriam, 1997).

The qualitative approach consisted of the following flow of activities: data reduction, “The process of selecting, simplifying, and transforming data that appears in written notes and transcriptions” (Miles and Huberman, 1994, p. 10); data display, “An organised, compressed assembly of information that permits conclusion drawing and action.” (Miles and Huberman, 1994, p. 11); and conclusion drawing and verification, “Deciding what things mean” (Miles and Huberman, 1994, p. 11). The qualitative analysis was done against data that consisted of respondent’s views, opinions, feelings and knowledge, which was captured in the form of direct quotations (Merriam, 1992). The data was collected with use of open-ended questions administered in the form of a combination of semi-structured in-depth interviews with the selected sample. The “choice selection” structured segment of the interview questionnaire (section two) also produced qualitative data, because as respondents selected their choices available to them, they felt obliged to justify their responses which in some instances resulted in an in-depth discussion. This detail was captured and used to augment both the quantitative data of that section and the qualitative data collected in section 3 of the interview questionnaire.

The strength of the collected qualitative data, was that the data was collected in its natural settings, indicating that the results are a good indication of “real world” experiences from the researched sector (Miles and Huberman, 1994). In this instance, the validity of the collected data was augmented by the fact that it was collected in the form of a personal interview as opposed, to the use of e-mail or over the phone discussions (Miles and Huberman, 1994).

4.3.1.2. Quantitative Research

Quantitative methods were used as part of the empirical study in gathering data that is quantifiable. The quantitative data collected for this research project included information

collected during the interview process, which served to understand the IT demographics of the organisations that partook in the research study, as well as in assessing the maturity of EA at the respective companies. This was vital as it created an understanding of the challenges to implementing or evolving EA against the prevalent maturity of EA. The quantitative analysis was conducted with the use of a structured “choice selection” questionnaire, and with the use of an EA maturity model described by Schekkerman (2006).

In summary, the combination of both qualitative and quantitative methodologies were a necessity, as supported by the views of Marshall and Rossman (2006) for the purpose of satisfying the research questions described in chapter 3.

4.4. Research Design

The research project took the form of 2 phases as detailed in section 4.4.1. The research design detailed the population of interest, and associated sample, specific methods for gathering data and a discussion of strategies for analysing the data (Marshall and Rossman, 2006).

4.4.1. Proposed Research Phases

The research study was conducted in 2 phases, which were exploratory in nature. The two phases can be described as follows:

- i. **Phase 1:** An experience survey was conducted with key informants (4 individuals) in the form of an in-depth interview, as part of a situational analysis exercise into the South African, and private healthcare context of EA. The individuals targeted were carefully selected as being knowledgeable individuals both directly and indirectly

involved in the industry investigated. In addition to assisting the research in formulating a deeper understanding of the research problem, it served as a practice round for the interview process, thereby verifying the validity of questions, quickly determining which questions needed rewording or which questions would not yield the required information. This phase was done in the form of open-ended interview questionnaires carried out through a face-to-face interview process (Merriam, 1992). Table 4.3 contains a list of the names and designations of the key informants. The key informants used in this phase are the most efficient form of data collection when the required information type is related to institutional norms and statuses. Furthermore key informants respond favourably to such interview processes as they are able to freely apply their knowledge, experience and insight (Marshall and Rossman, 2006).

Name of Expert	Designation
Expert 1	Business Intelligence Manager: Medi-Clinic (Pty) Limited.
Expert 2	COO: MediKredit Integrated Healthcare Solutions (Pty) Limited.
Expert 3	COO: Medscheme Administrators (Pty) Limited. Previous CIO of Medscheme Administrators (Pty) Limited.
Expert 4	Head of Health Systems, Discovery Health (Pty) Limited.

Table 4.3. Experts used during the consultation process detailed in Phase 1.

- ii. **Phase 2:** Issues that still needed clarification after the secondary data analysis were addressed during the exploratory investigation conducted during phase 2. Semi-structured, in-depth interviews in the form of both a structured (choice selection) and open-ended section of the interview questionnaire, facilitated the collection of in-depth qualitative data, as well as quantitative data (Zikmund, 2003). This allowed for specific information to be obtained, whilst allowing for the respondent to express their views in their own words (Merriam, 1992). Structured, “choice selection” questions

were extracted from the EAMM support guide (Schekkerman, 2006). They served to ask the respondent a question and then offered them specific limited alternative responses, requiring the respondent to select one best aligned with their viewpoint (Zikmund, 2003). It was accompanied by questions used to establish valuable IT demographics considered in evaluating the open-ended question responses (Wisker, 2001). The open-ended response questioning was effective in that it presented the respondent with a situation or problem, and then allowed the respondent to respond in their own words (Zikmund, 2003). During the interview process, responses were recorded mechanically in writing. Due to the sensitive nature of the questions, the initial respondents indicated their uneasiness with the digital voice recording of the interview.

4.4.2. Population and Sampling

Hussey and Hussey (1997, p. 55), describes a population as, “Any precise set of people of collection if items which is under consideration.”, and a sample as, “A subset of the population which should represent the main interest of the study.” The proposed population targeted for this research paper were companies that fell within the South African private healthcare service value chain as described in Chapter 1, which had a minimum annual turnover of R100 million and with a dedicated IT department. As per Patton (2002), the phenomenon being investigated, may be a program, process, an organisation or a culture. In the instance of this research study, it was the implementation and evolution of EA within the respective targeted organisations.

Based on principles or phenomenology as described by Patton (2002), it was of vital importance that the qualitative analysis be conducted on individuals that have lived the experience as opposed to conveying an experience that in turn was conveyed to them.

The secondary unit of analysis was therefore the current Chief Information Officer of the organisation, or an individual that held the relevant responsibilities within the last twelve months. As not all companies have a formal CIO, the alternative secondary unit of analysis targeted was detailed under section 1.2.

All efforts were made of interview respondents in organisations that were either number “1” or number “2” in their respective sector of the private healthcare service industry, or accumulatively made up the majority market share within their respective sectors with the other respondent companies. The sampling was based on judgment sampling, a non-probability sampling technique, in which the researcher based on his knowledge of the subject matter determined the appropriate characteristics required from the sample members (Zikmund, 2006). The snowball technique was also used to augment the sample group. This allowed the initial respondents to provide information on additional sample members, outside or inside the organisation that could best contribute to the research being conducted (Zikmund, 2006). Purposeful sampling allowed for the maximisation of information gathering from a limited number of respondents, yielding critical information from critically vital respondents (Marshall and Rossman, 2006).

The sampling technique for both the key informants and sample group as summarised in table 4.3 was founded on purposeful sampling in which the sample was strategically and purposefully selected dependent on the resources and purpose of the study.



Research Phase	Required Outcome	Data Collection Process	Sampling Technique	Sample Size
Phase 1	Pre-testing of the interview questionnaire. Key Informants verify the validity of the interview questions against the objectives of the proposed research.	Experience survey (Zikmund, 2003) in the form of unstructured, in-depth interviews (Marshall and Rossman, 2006).	Judgment (Zikmund, 2003).	4 experts
Phase 2	Structured and unstructured questions conducted through face-to-face interviews, with executives or managers detailed under section 1.2.	Semi-structured in-depth interviews in the form of structured and open ended questions (Zikmund, 2003).	Judgment sampling augmented by snowball sampling (Zikmund, 2003).	12 companies 12 individuals

Table 4.3. Sampling and Data Collection for Phase 1 and 2 of the research study

Individuals in academia, IT consulting (with a track record of knowledge in EA), and experts from within the sector being investigated were considered for participation within Phase 1. Key informants were used to pre-test or evaluate the effectiveness of the interview questionnaire in ensuring that the questions, the maturity model assessment and its respective statements could be understood, and answered appropriately by the respondents. Members of academic institutions were excluded from the sample group for Phase 2.

4.4.3. Questionnaire design

The questionnaire (the research instrument) was developed from the findings of the non-empirical research to assist in extracting the required data regarding the respondent's company IT demographics, EA maturity levels, and themes relating to the implementation and evolution of EA. A copy of the questionnaire appears in Annexure 1. Prior to the questionnaire being distributed to the respondents, it was vetted by a group of key informants considered to be opinion leaders in their respective industries

Questionnaires were distributed to the respondents via e-mail after they had accepted the interview appointment but prior to the actual interview. This was done to allow the respondents to prepare and to bring departmental experts into the interview process if required. In some instances, after the targeted respondents read the interview questions, based on their judgement they invited key resources that were better equipped to address the questions. All the targeted respondents requested anonymity, due to the perceived sensitive nature of the information being discussed. The researcher guaranteed this to ensure that the respondent addressed the questions as accurately as possible without reservations.

Both the structured and unstructured portion of the questionnaire were administered through a semi-structured in-depth interview. Semi-structured interviews managed the need for the interviewer to develop a conversation with the respondent, which was often rich and rewarding, while allowing the interviewer to return to the structured interview questions when required (Merriam, 1992).

The structured portion (section 1 & 2) of the questionnaire was used to determine the IT demographics and EA maturity of the organisation (Zikmund, 2003), where as the unstructured section of the questionnaire addressed the experiences the respondents had. The responses to Section 3 of the interview process were more detailed and variable in content, making its analysis more challenging because its responses are neither systematic nor standardise (Patton, 2002).

4.4.4. Data Collection and Data Management

It is of vital importance that the most practical, efficient, feasible and ethical method is used for the collection of data (Marshall and Rossman, 2006). Qualitative findings grow from three kinds of possible data collection being in-depth, open-ended interviews; direct observation and written documents. The interview process was vital as it yielded direct quotations from respondents about their, “experiences, opinions, feelings and knowledge, based on the respondent’s activities, behaviours, actions and a full range of interpersonal interactions with the organisational processes” (Patton, 2002, p. 4). Document analysis included studying excerpts, quotations or entire passages collected from the face-to-face in-depth interviews (Patton, 2002).

The open ended question of the questionnaire enabled the researcher to understand and capture the view points of the respondents without pre-empting those viewpoints through prior selection of the questionnaire categories. Patton (2002) suggests that the use of direct quotations is valuable as a source of raw data, indicating how respondents have organised their thoughts and experiences and basic perceptions. Therefore, as stated in point 4.4.1, in-depth interviews with key informants was used for phase 1 of the research study while, phase 2, combined an interview process which was constructed from a structured and open-ended questionnaire conducted in the form of a semi-structured interview process.

4.4.5. Data Analysis

Data analysis is the process of making sense out of the primary data which was captured during the interview process (Zikmund, 2003). The questionnaire was designed in such a manner so that the results from section one and two (quantitative) could be captured onto

an Excel spreadsheet. The data collected from section three (qualitative) was transcribed into a Excel document for further analysis.

4.4.5.1. Content Analysis

There are multitudes of ways to analyse respondents' experiences, which can then be displayed in the form of organised descriptive accounts, themes or categories that are prevalent across the data. Content analysis was the primary technique used to measure the content of the communication in section 3 of the interview questionnaire (Hussey and Hussey, 1997). This technique obtained data by observing and analysing the content of the interviews conducted with the respective respondent, indentifying information content and characteristics. This was done by measuring the extent of emphasis or the omission thereof of an analytical category, or in the instance of this research project a theme (Zikmund, 2003). Content analysis may identify, "the use of certain words, themes, characters or space and time relationships" (Zikmund, 2003, p248).

The study of the content of communication is seen as more sophisticated than simply counting items within its content (Zikmund 2003). The process of content analysis was augmented with a thematic analysis, a process in which themes and concepts were indentified during the content analysis (Marshall and Rossman, 2006). The use of thematic analysis indicated the basic or generic qualitative research project served to indentify recurrent patterns in the form of themes or categories. It allowed better understanding and categorising of experiences and ideas that emerged from the interview process. This analytic process however demanded a heightened awareness of the data, and a focussed attention to undercurrents in the respondent's environment. It was necessary to identify salient themes, recurring ideas or language and patterns of beliefs (Merriam, 1997).

4.4.5.2. Thematic Analysis

The use of thematic analysis was motivated by research questions 2-5, in that it allowed researcher to identify and better understand recurring patterns and themes, in the text or less organised data (Aronson, 1994). The process described in section 4.4.5.1, resulted in the emergence of themes that were internally consistent but distinct from each other. These themes were not as exhaustive or mutually exclusive as those that would possibly be constructed by a statistician. It was an inductive process in that the pattern and themes were identified from the data as opposed to applying the data to pre-determine analytical categories. The categories of themes (theme coding) were then established by the researcher to reflect the respondent's viewpoints (Marshall and Rossman, 2006).

It was therefore important to have identified evidence of a repeating pattern, but to remain open to conflicting evidence, in order not to resist new evidence (Miles and Huberman, 1994). The occurrence and consistency assessments were based on counting, as well as its significance or importance and relevance. Through the counting of themes the research project was kept analytically honest (Miles and Huberman, 1994). To conduct a thematic analysis, the following was required (Aronson, 1994; Lane, Koka and Pathak, 2002):

1. Transcribe the conversations and then to list patterns or experiences or opinions. This was done through paraphrasing common ideas or through direct quotes.
2. Identify all the data that related to the already classified patterns or themes. Alternatively common themes were created.

3. Combined and catalogued related themes into sub-themes if required. Themes and sub-themes were created bringing together components of ideas and / or experiences, which had little value when analysed in isolation.
4. Built a valid argument for having selected the said themes. This was done by relating back to the secondary analysis and by using the research questions.

The themes were presented in the form of a matrix. The sub-themes were created under the respective main themes (or research questions). They were then arranged according to rank order. According to Marshall and Rossman (2006), the researcher needed to be aware of imposing the researcher's world on the results. Special cognisance of this was taken into account during the interviewing, data capturing and data analysis process.

4.4.5.3. Enterprise Architecture Maturity Assessment (EAMM)

Data collected from Section 2 of the questionnaire of the interview questionnaire involved an analysis of the EAMM (Schekkerman, 2006).

The assessment (evaluation of the organisations' maturity levels), served to determine its respective EA maturity level (The Open Group, 2007). The EA maturity levels were assessed for each specific element of the EA maturity model, as well as for the complete EA maturity model (Schekkerman, 2006). In deciding the maturity level, of each element and for the entire model, if an analysis indicated that the EA criteria of did not meet the entire description of a core element, as defined in the framework, or for the combined elements of the maturity model, the organisation was assigned to the next lowest stage of framework maturity. In simple terms the organisation had to meet all core elements for a specific level of the maturity model as a whole (GAO, 2003).

The following however needed to be noted:

- The results were accepted from the interviewees as accurate. The respondents were not required to confirm their responses with supporting documentation (GOA, 2003).
- The respondent's responses were not independently verified (GOA, 2003).
- Where appropriate, respondents were requested to clarify their responses verbally (GOA, 2003)
- The maturity questionnaire was the sole basis of the maturity assessment, and
- The researcher was not formally trained on the maturity assessment processes.

The maturity assessment process was, however, considered sufficient due to time and funding constraints, as well as resistance by respondents to supply market sensitive information. These factors would have prevented a full assessment from having been conducted.

4.5. Data Validity and Reliability

According to Wisker (2001), the significance of the findings could be categorised into Generalisability, Reliability and Validity. In terms of generalisability, the sample size being small, with no more than 12 individuals across 12 companies and being non-probabilistic were not generalised across the various business sectors in South Africa or within the same sectors internationally. Statistical inferences could not be drawn from this sample. It is considered to have external validity, as the results could be transferred to the real world, limited to the South African context of this sector (Zikmund, 2006).

Reliability relates to the degree to which the analysed data was error free. With a component of the research being qualitative in nature, it suggested that the results may not be replicable. However care was taken to maintain records of procedures, decisions made and protocols used (Zikmund, 2006). Transcripts of conversations were analysed immediately. Due to the fact that the EA maturity assessment model was not conducted by a trained individual, supported with documentation and not independently verified, the results of the maturity models may not be data-error free.

4.6. Potential Research Limitations

As discussed in section 4.5, the limitations of this study, being a small non-probabilistic sample was inherently subjective. It may, therefore, neither be generalised across the various business sectors in South African or within the same sectors internationally.

- Statistical inferences could not be drawn from this sample. With a large component of the research being qualitative in design, the researcher acknowledged the lack of structure and limitation of the research process (Marshall and Rossman, 2006).
- The data collected could have been influenced by interviewer bias, due to the sensitive nature of the data collected.
- The EA maturity assessment required expertise on the part of the researcher.
- The EA maturity assessment was not conducted against strict protocol guidelines which required that the results be supported by documentation and verified independently.

4.7. Chapter Summary

This chapter has motivated the various options available to conduct the proposed research in the context of a phenomenological philosophy. This research project utilised both non-empirical and empirical approaches and the use of both quantitative and qualitative approaches were considered beneficial. It was administered through the use of structured and open-ended questions (data collection instrument), facilitated through a semi-structured interview process. The research being exploratory in nature used a combination of analysis methods, being thematic and content analysis.

5. Chapter 5: Results

5.1. Introduction

This chapter describes the data gathered during the empirical work phase, facilitated by 12 interviews, as described in chapter 4. The research project used both qualitative and quantitative methods to assess maturity levels of the EA and the challenges to its implementation and evolution in companies that play a significant role in the private healthcare service industry. The findings in this chapter are segmented into the following phases and presented without formal analysis:

- i. Phase 1, in which key informants “piloted” the validity of the interview questionnaire in terms of its appropriateness, ease of understanding and ability to address the research question, and
- ii. Phase 2, in which the data collected from the respondents, by means of a questionnaire (Annexure 1) facilitated by semi-structured face-to-face interviews.

This data is presented in the following sections:

- Section 1 – Respondent company IT demographics, obtained through a structured, ‘choice selection’ questionnaire.
- Section 2 – EA maturity levels, obtained through a structured, ‘choice selection’ questionnaire.
- Section 3 – Respondent’s views regarding the challenges to the implementation and / or evolution of EA at the respective companies.

The IT demographics for the respective companies are important as they serve to establish the context, structure and importance of their IT. EA maturity assessment enables challenges related to the implementation and maturation of EA to be contextualised against different levels of maturity, if required. The final section of this chapter relates to extraction of opinions, and understanding related to the implementation and evolution of EA within the respective companies, and industry being investigated. A thematic analysis is conducted to identify and present the common themes emerging from this section of data collected. It is quantified through the principles of content analysis and then rank ordered according to prevalence. These emergent themes are used to understand the challenges to the implementation and evolution of EA.

5.2. Findings from the Questionnaires

Fifteen respondents and respective companies were targeted which complied with the primary and secondary unit of analysis as stipulated in section 1.2. Judgment sampling, a non-probability sampling technique, was used to select the sample. Of the fifteen interview requests only twelve interviews were undertaken. Two respondents declined due to the sensitive nature of the information required, and the researcher's association with the industry investigated. The third respondent initially accepted the interview invitation, but subsequently declined without supplying a reason. Due to the highly competitive nature of the industry the respondents have requested anonymity for themselves and their organisations.

Figure 5.1 illustrates the value chain of the private healthcare services industry. The respondent companies are either number "1" or number "2" in their respective sector of the

industry, or accumulatively with the other respondent companies, constitute a majority market share.

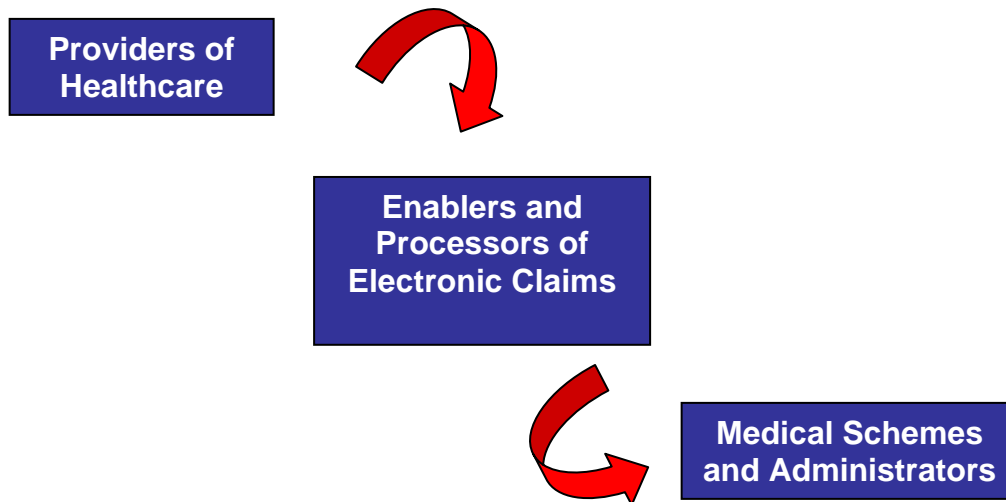


Figure 5.1. The Value Chain of Healthcare Services Industry.

- Providers of Healthcare. These are defined as providers of private professional health services for reimbursement. They are registered to perform these services with the relevant statutory professional bodies (CMS, 2006).
- Enablers of electronic claim submissions. This leg of the value chain of healthcare delivery would include:
 - i. Pharmacy (Health) electronic benefit managers (PeBM). These are companies that processing private healthcare claims electronically on a real-time basis against medical schemes', clinical and financial rules. They offer a financial and clinical risk management services to the providers of healthcare, medical schemes and administrators (CMS, 2006).

- ii. Electronic file transfer “switches’, which is a computer based interchange linkages, between the members of the healthcare service value chain (O’ Callaghan, R. Kaufmann, P.J. and Konsynski, B.R, 1992).
 - iii. Practice Management System (PMS) vendors which are medical software systems, with embedded data bases and embedded interfaces, with inventory and accounting functions (Miller, R.A. and Gardner, R.M., 1997).
- Medical Scheme Administrators. These are defined as “for-profit” organisations that are legally obliged to be accredited by the Council for Medical Schemes to administrate medical schemes contracted to them in accordance to the statutory requirements of the Council (CMS, 2006). Most of the administrators are divisions of listed companies. Medical Schemes, are defined as a not-for-profit organisation with the fiduciary responsibility to manage and design healthcare benefits for its members (CMS, 2006).

5.2.1. Findings - Phase 1

This phase of the research project, uses “key informants”, as described under table 4.3 to pilot the validity, appropriateness and the ability of the, survey, EAMM and open-ended questions to address the research questions. The “user-friendliness” of the interview process, and the questionnaire is also considered. The following key finding are unanimous:

- The key informants are comfortable with the nature and time taken to participate in the interview questions.
- Their view is that the three sections of the questionnaire will address the research objective.

Concerns are, however, raised, with the following being highlighted:

- The researcher is not trained to conduct EA maturity assessments and the process being implemented is not substantiated with documentation and not verified independently. This concern is raised by 4 key informants.
- The nature of the information supplied is sensitive in nature and the view is that company respondents might be hesitant to participate without prior board approval. The recommendation is made that the researcher guarantees anonymity. This concern is raised by 2 key informants.
- One key informant raises the concern that the subject of EA is very broad and difficult to understand and assess accurately through the use of a questionnaire facilitated through an hour long interview.
- One key informant, indicates that the EAMM is at stages difficult to read, and makes the suggestion that each question be preceded with a preamble, adding more detail to the intent of the question.

Irrespective of the above points, the key informants unanimous from the view point that the questionnaire is useable for the purposes of this research project. They do, however suggest that the respondents are given preparation time prior to the interview process.

5.2.2. Findings Phase 2 - Section 1

This section of the questionnaire contains 17 “choice selection” questions, from which the respondent is given several options from which the respondent had to choose one option. This section serves to better understand the demographics of the organisations from the context of IT and the associated management processes. Twenty-five percent (3) of the respondents interviewed requested the presence of their functional IT manager to participate in the interview process so as to assist in responding to the interview questions.

5.2.2.1. Question 1.1. *What is your organisation’s IT staff compliment?*

The IT staff compliment illustrated in figure 5.2 includes staff used for IT development and support and excludes in-field technical support, project management and project quality management staff.

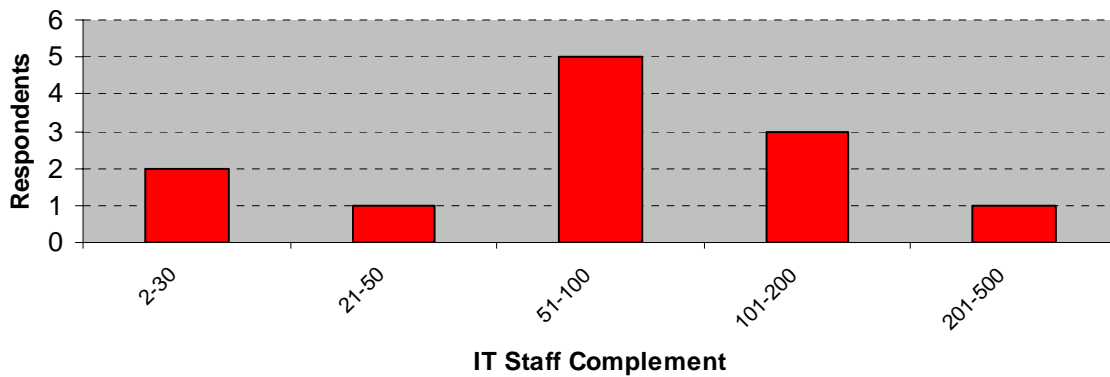


Figure 5.2. IT Staff Complement

Forty-two percent (5) of the respondents have an IT staff complement of “51-100”, with the 17% (2) of the respondents having the lowest recorded IT staff compliment of “2-30”. The largest IT staff compliment is held by 1 respondent, being “201-500”.

5.2.2.2. Question 1.2. *What is the annual turnover of your organisation?*

This question serves to verify that all the companies participating in the interview process meet the selection criteria for the primary unit of analysis described in section 1.2. All companies met the selection requirements.

5.2.2.3. Question 1.3. *How critical is IT to your organisation in sustaining its day to day operations?*

This serves to verify the importance of IT at the respondent companies to sustaining their day-to-day operations. One hundred percent (12) of the respondents indicate that IT is “*very important*” in sustaining its day to day operations.

5.2.2.4. Question 1.4. *How important is Information Technology to enable growth and achievement of your organisation’s strategic objectives?*

This question serves to augment the response from question 1.3, by indicating the importance of IT in enabling the organisation to achieve its strategic goals. Ninety-two percent (11) of the respondents rate IT as “*very important*”, with 1 respondents rating it as “*of high importance*”.

5.2.2.5. Question 1.5. *Does your organisation have an IT Strategy Committee or IT council that reviews major investments on behalf of the board and executive management, and advises the Board on strategic IT decisions?*

Questions 1.5 up to and including question 1.12, offers insight regarding IT governance, reporting structures and the relationship between senior management and the IT infrastructure.

As illustrated in Figure 5.3, 67% (8) of the respondents indicate “*Yes*” to the presence of a formal IT strategy committee or IT council responsible for reviewing all major IT investment. Thirty-three percent (4) of the respondents indicate “*No*”.

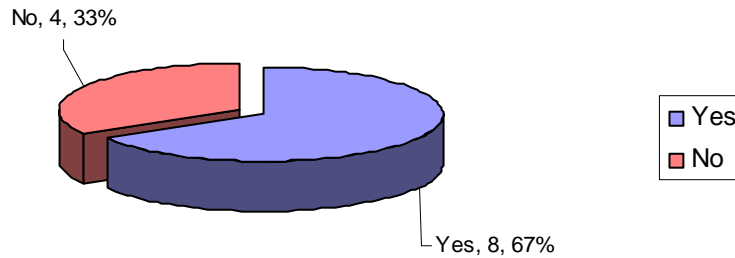


Figure 5.3. Presence of an IT strategy or council.

5.2.2.6. Question 1.6.a. *If “Yes”, then does the IT strategy committee or IT council involve the CIO and the most senior IT and senior business managers?*

Question 1.6.b. *Set priorities for IT initiatives and assigns ownership for IT enabled business opportunities?*

Questions 1.6. a, and b, are only applicable to the respondents that answer “Yes” in question 1.5., 100% (8) of these respondents indicate “Yes” to the IT strategy committee “involving the most senior IT and Business persons in the organisation”, and to “setting priorities for IT initiatives and for the assigning of ownership for IT enabled business opportunities”.

5.2.2.7. Question 1.7. *Is your organisation’s IT strategy influenced by your Board / Exco’s business objectives for IT alignment, and based on the organisation’s strategic plan?*

This question serves to assess the alignment between IT strategy and business objectives. As shown in figure 5.4, 92% (11) of the respondents answer “Yes” indicating that their IT strategy is influenced by the Board / Exco’s business objectives for IT alignment, and based on the organisation’s strategic plan.

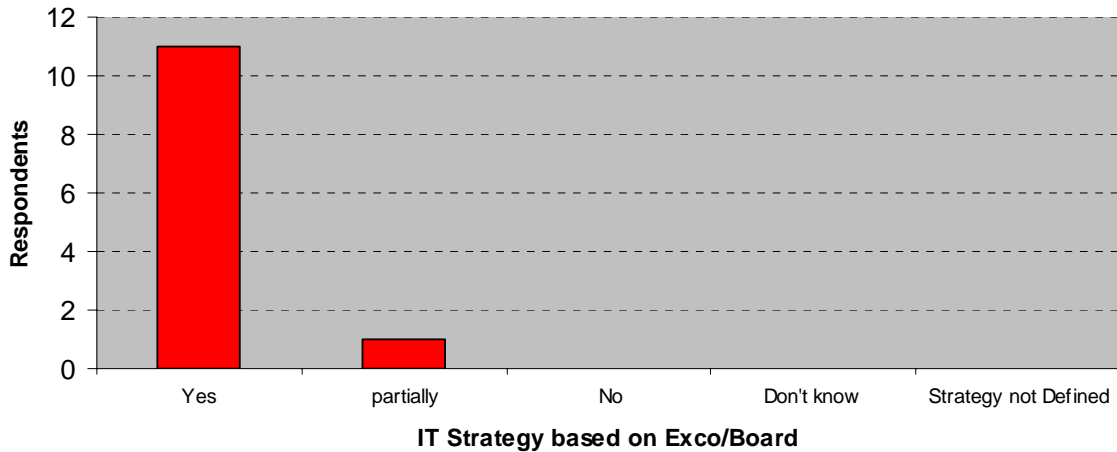


Figure 5.4. Influence of Board / Exco over IT Strategy

5.2.2.8. Question 1.8. *The strategic value of IT is understood by my organisation’s board and executive management.*

This question serves to assess whether there is an understanding of IT’s strategic value, by the same Board / Exco that sets the strategic objections for the organisation. The results, as illustrated in figure 5.5, indicate that 42% (5) of the respondents “fully agree”,

while 58 % (7) “agree somewhat”, that the Board / Exco understands the strategic value of IT.

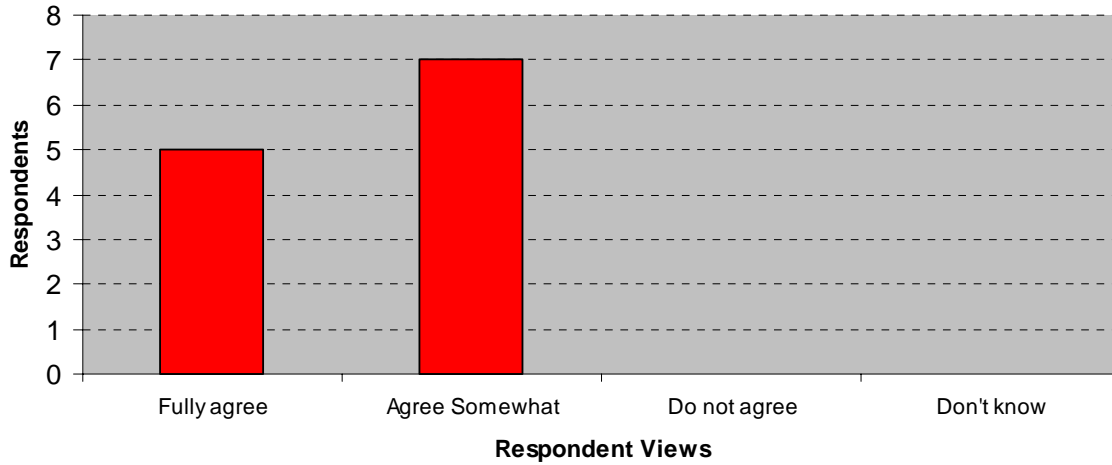


Figure 5.5. Understanding of IT strategic Value by the Board / Exco

5.2.2.9. Question1.9. *All major IT investments in my organisation are taken in consultation with the Board / Exco, and are based on a risk return perspective*

This question describes the company’s Board / Exco involvement in all major IT investments. The results, as illustrated in figure 5.6, show that 50% (6) of the respondents “fully agree” and 50 % (6) of the respondents “agree somewhat”, with the statement.

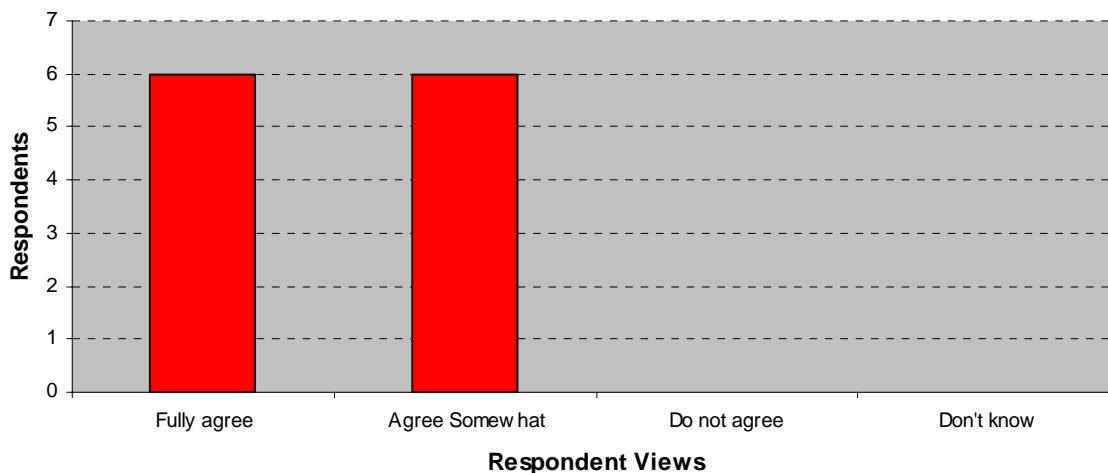


Figure 5.6. Board / Exco's involvement in all major IT investments

5.2.2.10. Question 1.10. *Does your IT department fully understand the business needs of your organisation?*

This question assesses the IT department's ability to understand the business needs of the organisation. The results, as illustrated in figure 5.7, indicate that 83 % (10) of the respondents claim that IT understands the organisation's business needs "to a large extent", while 17 % (2) of the respondents claim "to some extent".

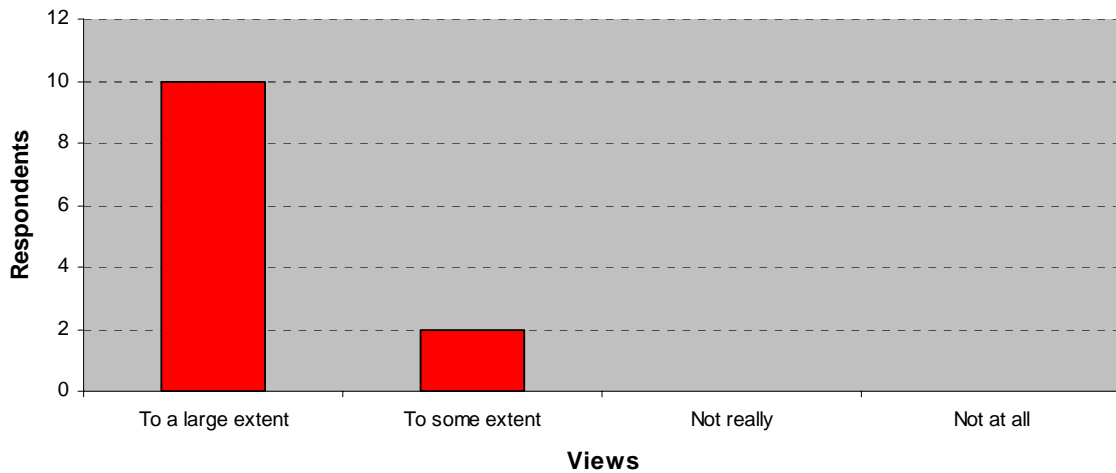


Figure 5.7. IT's Understanding of the organisation's business objectives

5.2.2.11. Question 1.11. *To whom do your organisation's most senior IT Director / manager report to?*

The results, as illustrated in figure 5.8, indicate that 58 % (7) of the respondents report to the CEO/MD, 25% (3) of the respondents to the CFO/FD, and 17% (2) of the respondents to the COO.

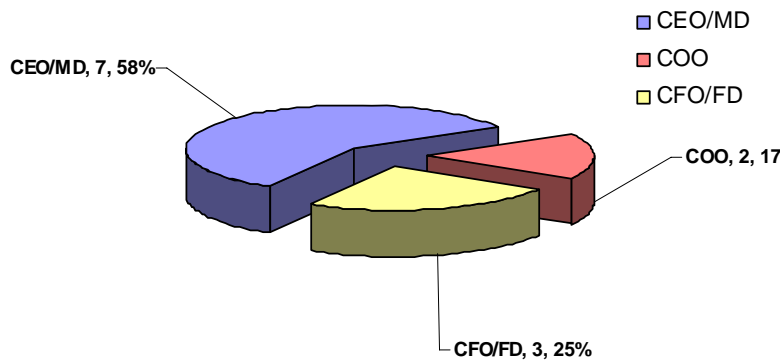


Figure 5.8. Reporting Hierarchy for the most senior IT person.

5.2.2.12. Question 1.12. *How good is your organisation’s board / executive management at getting assurance on the performance of IT and on the mitigation of IT risks?*

Question 1.12, assists in understanding the level of alignment between IT and business within the organisation, beyond, merely dealing with one another, but rather ensuring that there is an understanding (and commitment to delivery) of risks and performance by IT. Figure 5.9, illustrates the level of this in-depth understanding. Fifty percent (6) of the respondents indicate that the Board/Exco’s ability at getting assurance on the performance of IT and on the mitigation of IT risks, is, “good”, with 42% (5) of the respondents indicating, that their ability is “very good”, while 1 respondent indicates that it is “adequate”.

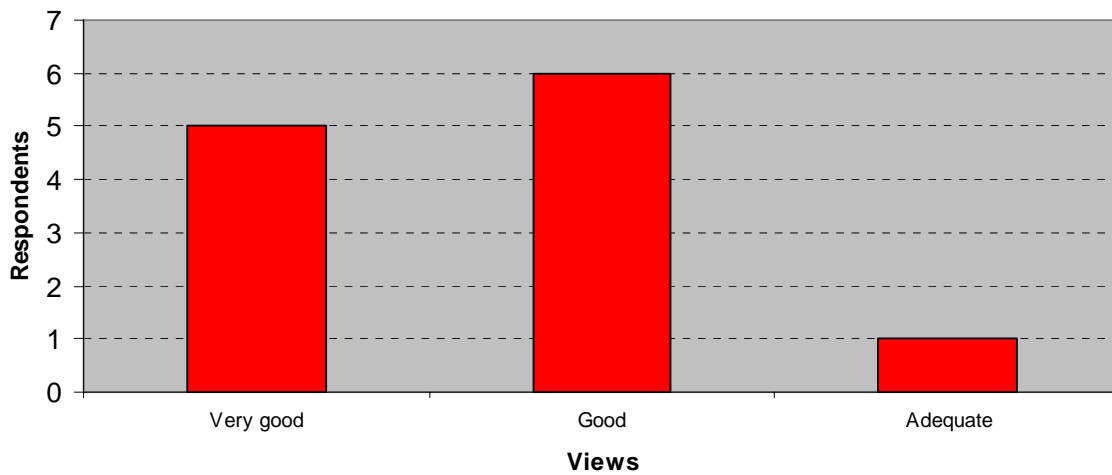


Figure 5.9. Board / Exco’s ability to secure IT performance and mitigate risks

5.2.2.13. Question 1.13. Does your organisation currently make use of a formal Enterprise Architecture framework?

Question 1.14. If yes, which EA model or framework is used by your organisation?

Questions 1.13 to 1.17 seek to understand the utilisation of EA within the organisation. Question 1.13 and 1.14, need to be viewed jointly to understand the respondent's stance on the use of EA frameworks within the organisation. Figure 5.10, reveals that 42% (5) of the respondent companies make use of a formal EA framework, whereas the balance, 58% (7) of the respondent companies do not.

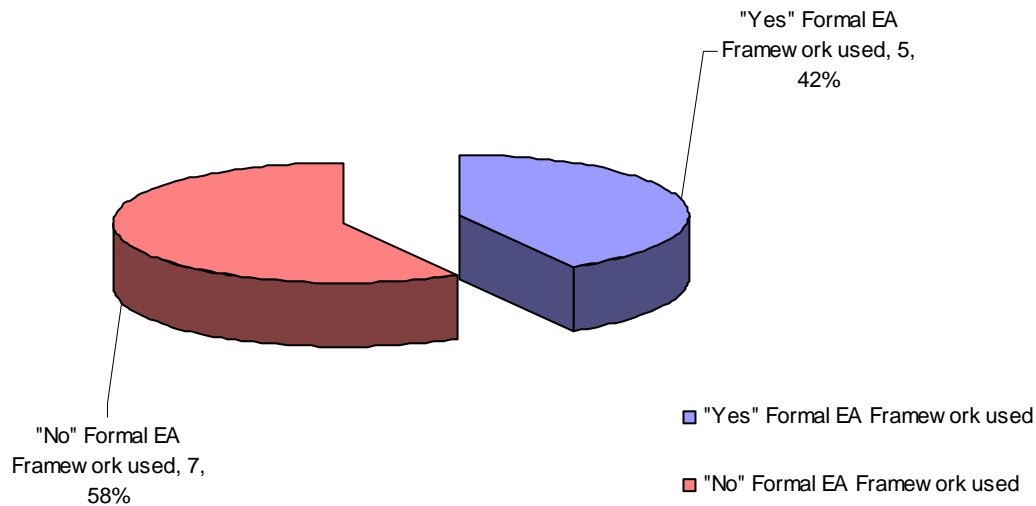


Figure 5.10. Use of a formal Enterprise Architecture framework

Respondent companies that answer "NO" suggest that although a formal EA framework is not used, the respective company has embraced and implemented the principles of EA, either creating a company specific EA framework or utilising a number of EA components or elements of EA from across a number of frameworks.

Figure 5.11, revealed that for question 1.14, 42% (5) of the respondent companies use a “*combination*” of existing EA frameworks, citing Gartner and Zachman, whereas, 25% (3) of the respondent companies implemented “*company specific*” EA frameworks, thereby addressing the specialised needs of their organisation. One respondent company indicates the use of an “*existing EA framework*”, with the balance, 25% (3) of respondent companies indicating the use of “*components*” of a formal EA framework.

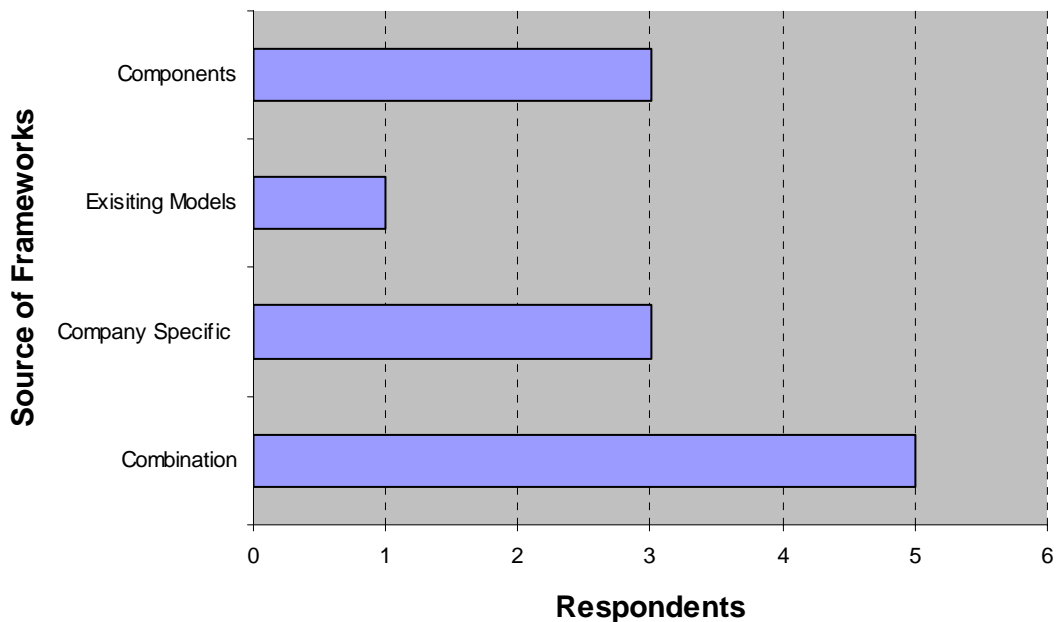


Figure 5.11. EA Framework of choice

5.2.2.14. Question 1.15. *If your organisation has already implemented an EA framework, when was it deployed?*

This question attempts to understand how long the respondent companies have been utilising the principles of EA. The results illustrated in figure 5.12, show that 50 % (6) of the respondent companies implemented EA “1-2 years ago”, whereas 42% (5) had

implemented EA “*more than 3 years ago*”. Only 1 respondent company implemented the EA (or its principles) less than a year ago.

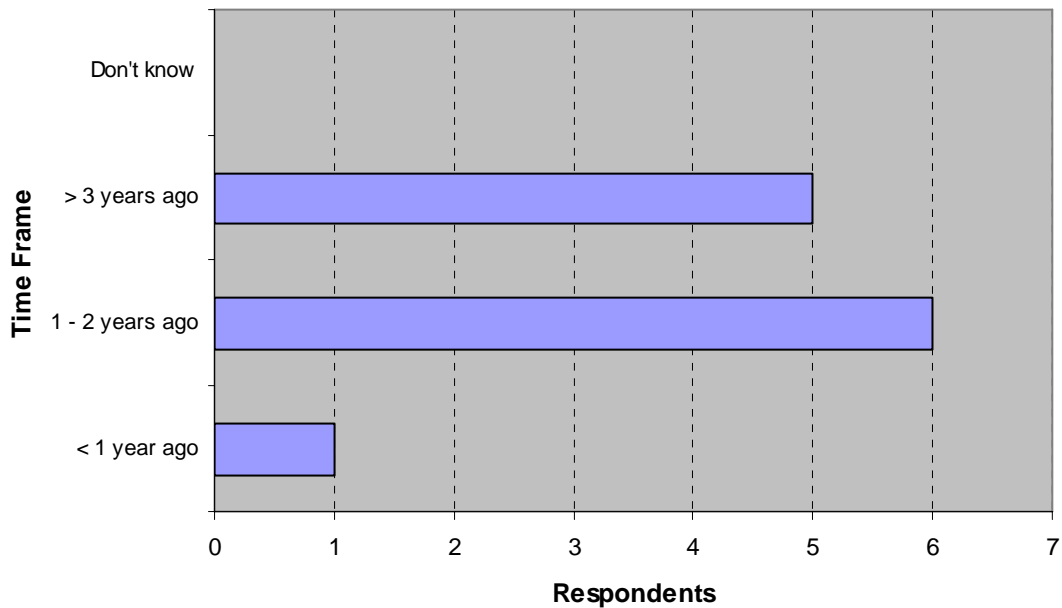


Figure 5.12. When was EA implemented?

5.2.2.15. Question 1.16. How was the EA solution implemented?

The results to this question reveal in figure 5.13 that the implementation of EA and its principles is achieved at 58% (7) of the respondent companies using their “*own resources*”, whereas 42% (5) of the respondent companies use a “*combination of both internal and external resources*”.

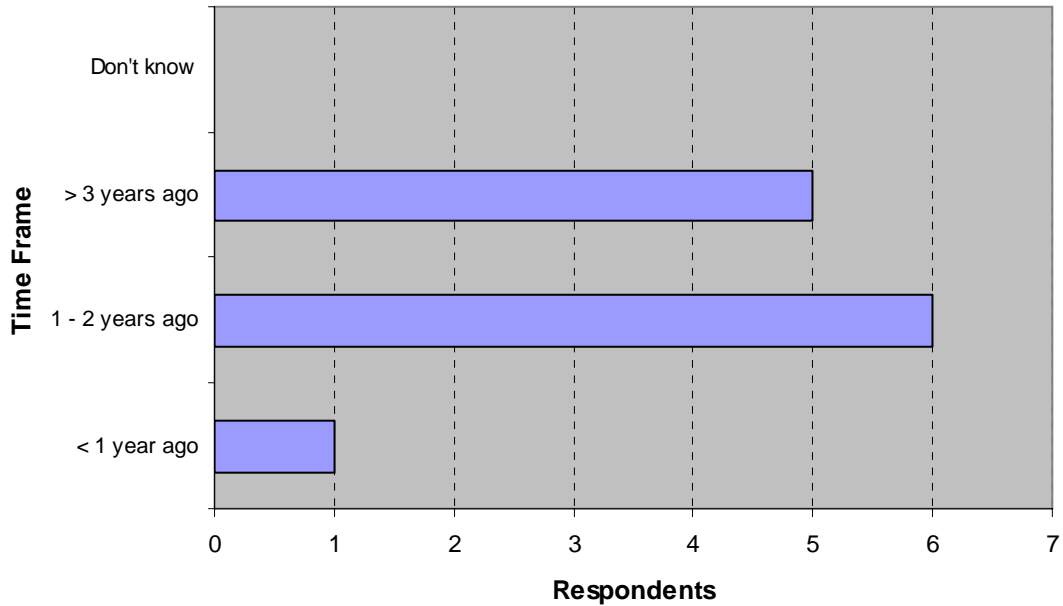


Figure 5.13. Types of resources used for EA implementation.

5.2.2.16. Question 1.17. How difficult / easy was the implementation of EA?

Question 1.17 reveals the respondent's views on the "difficulty" levels associated with the implementation of EA. As shown in figure 5.14, 33% (4), and 42% (5) of the respondents indicate that the implementation of EA was either "difficult" or "moderately difficult" respectively. 25% (3) of the respondents indicate that that the implementation process was "easy".

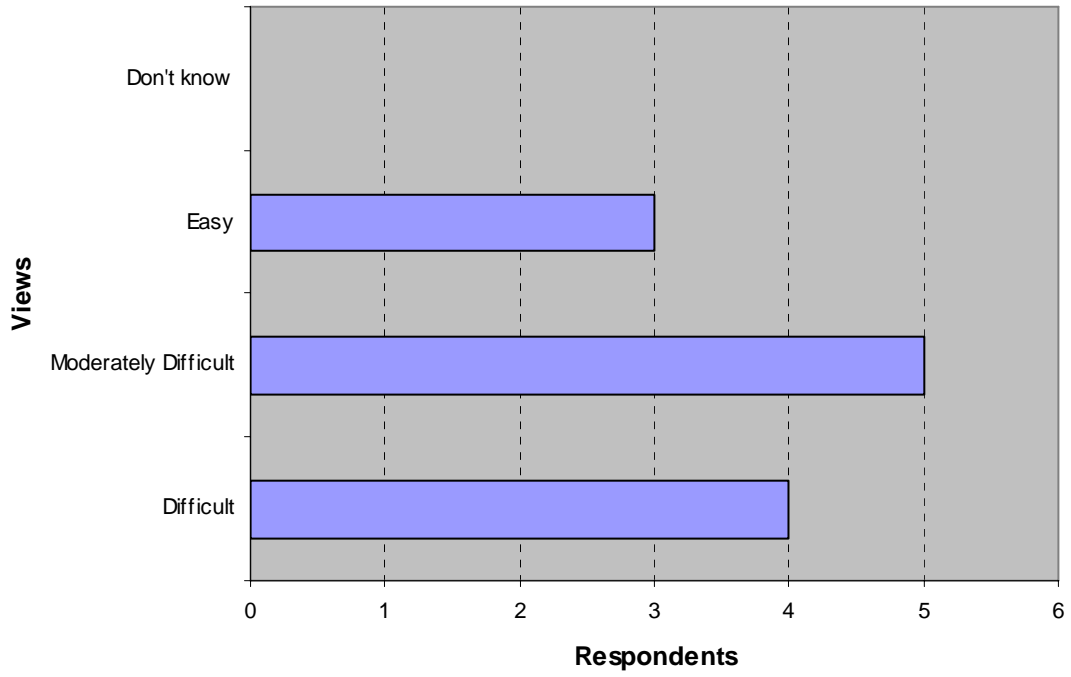


Figure 5.14. “Difficulty” level associated with implementing EA within the organisation

5.2.3. Findings Phase 2 - Section 2

Section 2 of the questionnaire (structured) uses The Institute for Enterprise Architecture Development's (IFEAD) extended EAMM to assess the maturity levels of the respondent company as described under section 4.4.5.3. It provides a path to identify EA maturity levels within the company as well as the EA and procedural improvements required to evolve the company to the next level of maturity. This is a key requirement of this study. The organisation's maturity levels are assessed holistically as well as for each element of the EA maturity assessment guide. In instances where the respondents have not implemented a formal EA framework, the respondent's questions are re-phrased to refer to the implementation of "EA principles". The results of the maturity model are shown as a final outcome for each respondent company (last row), as per table 5.1. The maturity results for the individual EA elements are displayed under the numbered columns allocated to each respondent company.



Respondents	1	2	3	4	5	6	7	8	9	10	11	12	Mode	Min	Max
EA maturity elements															
Strategic Business & Technology alignment	3	3	2	3	3	3	2	3	3	3	2	1	3	1	3
Extended Enterprise Involvement	2	2	3	2	3	3	2	3	2	3	2	2	2	2	3
Executive Management Involvement	3	2	3	3	2	3	2	4	3	4	1	1	3	1	4
Business Unit Involvement	3	3	3	3	1	3	2	3	3	3	1	2	3	1	3
Architecture Program Office	1	2	2	1	0	2	1	3	3	2	0	0	2	0	3
Enterprise Architecture Developments	1	2	2	2	2	3	1	2	3	3	1	1	2	1	3
Enterprise Architecture Results	2	3	2	2	2	2	2	2	3	3	0	0	2	0	3
Strategic Governance	1	3	2	1	1	2	1	3	3	2	1	1	1	1	3
Enterprise Program Management	1	2	2	1	1	3	1	3	3	2	0	0	1	0	3
Holistic Enterprise Architecture	1	2	2	2	3	3	1	2	2	3	2	0	2	0	3
Budget & Procurement Strategy	2	2	2	2	2	3	2	4	3	3	0	2	2	0	4
EA Maturity Levels	1	2	2	1	0	2	1	2	2	2	0	0	2	0	2

Table 5.1. EA maturity levels of the respondent companies

The data from the EA maturity assessment questionnaire is in accordance to the methodology described in section 4.4.5.3.

The highest (maximum) company EA maturity levels (last row) attained is “*level 2*” (Under Development), for respondent companies, 2, 3, 6, 8, 9, and 10, with “*level 0*” (No Enterprise Architecture) being the lowest (minimum) EA maturity level attained. This is attained by respondent companies, 5, 11 and 12. The mode, being the most frequently occurring maturity level is “*level 2*” (Zikmund, 2003). Fifty percent (6) of the respondent companies attained a “*level 2*” (Under Development) EA maturity. Twenty-five percent (3) of the respondent companies attained a “*level 1*” (Initiated) EA maturity, whereas 25% (3) of the respondent companies attained a “*level 0*” (No Enterprise Architecture) EA maturity.

From the perspective of the individual elements of EA maturity (numbered columns), the highest elemental EA maturity level attained is “*level 4*” (Managed) for “*Executive management involvement*” with 17% (2) of the company respondents, as well as for “*Budget and procurement strategy*”, with 1 respondent company. Conversely, the lowest elemental EA maturity levels attained is “*level 0*” (No Enterprise Architecture). It is attained for “*Architecture Program Office*”, with 25% (3) of the respondent companies; “*Enterprise Architecture Results*”, with 17% (2) of the respondent companies; “*Enterprise Program Management*”, with 17% (2) of the respondent companies and “*Holistic Enterprise Architecture*” with 1 respondent company. The highest ‘minimum’ elemental EA maturity level attained is “*level 2*” (Under development) for “*Extended Enterprise Involvement*”, with 50% (6) of the respondent companies.

5.2.4. Findings Phase 2 - Section 3

Data from for this section of the questionnaire is collected with the use of an open ended questionnaire facilitated by a semi-structured, face-to-face interview with the secondary unit of analysis. Questions 2 – 8 includes excerpts of the respondents' views to the open-ended questions. They serve to create confirmation and understanding for the reader with regards to the themes that are identified to address the research questions. These themes are counted and listed according to their rank. Tables 5.2 – 5.8 serve to present the identified themes as narrated by the respondents, as they relate to the factors that influence or potentially influence the implementation for evolution of Enterprise Architecture within their respective companies.

5.2.4.1. Question 1. At which level is your company's EA maturity level?

Respondents are questioned as to what they believed their company's EA maturity level to be at. This is asked after the maturity assessment questionnaire was completed, but without the respondents having knowledge of the final EA maturity assessment. Fifty-eight percent (7) of the respondents perceive their company's EA maturity at a "level 2", with 1 respondent perceiving, it to be at a "level 3" EA maturity. Thirty-three percent (4) of the respondents perceive their EA maturity to be at a "level 1". The same respondents indicate that the EA process is already underway, but requires time to bring the entire organisation to higher levels of EA maturity.

5.2.4.2. Question 2: What are the internal company elements that influence the implementation or evolution of EA within your organisation?

This question serves to identify themes relating to internal company elements that can augment or hinder the implementation and evolution of EA at the respondent companies.

The emerging themes are captured in table 5.3

Rank	Theme	Excerpts from interview	Count	%
1	"Business Understanding"	"It's seen as a fun thing that you do in your spare time, as a break from normal work." "Once you have business understanding the process is significantly easier."	8	67%
2	"Alignment with Business"	"Our medium to long terms strategy is not clear or stabile. Our response is more reactive than what it should be."	7	58%
3	"Resource Time"	"Availability of Time is critical. Its an continuous attempt to meet long term business objectives and strategies without compromising day-to-day expectations."	4	33%
4	"Availability of Resources"	"The quality and availability of resources has deteriorated recently. It's incredible. We have had a 30% turnover of IT staff in the last 18 months. It seems to be a global problem."	4	33%
5	"Competitive Advantage"	"Our corporate clients demand this"	3	25%
6	"The Challenge of Change"	"Change is difficult if departments don't understand the changes that are being introduced." "The ark could not have been built without the ability to mobilise people."	2	17%
7	"Governance"	"Some of our corporate clients are listed overseas, they comply with tough governance norms, therefore we are required to as well."	2	17%

Table 5.2. Internal drivers that influence the implementation or evolution of EA

As illustrated in figure 5.15, the most prevalent theme that emerges from this question is “Business understanding of EA”, with 9 (67%) respondents raising this as a concern. “Alignment with business”, IS the next most prevalent theme with 6 (50%) respondents. “Resource time” and “availability of resources”, emerge each with 4 (33%) respondents identifying these themes as internal hindrances to EA. Additional themes identified are “the challenge of change” and “governance” with 3 (25%) respondents each.

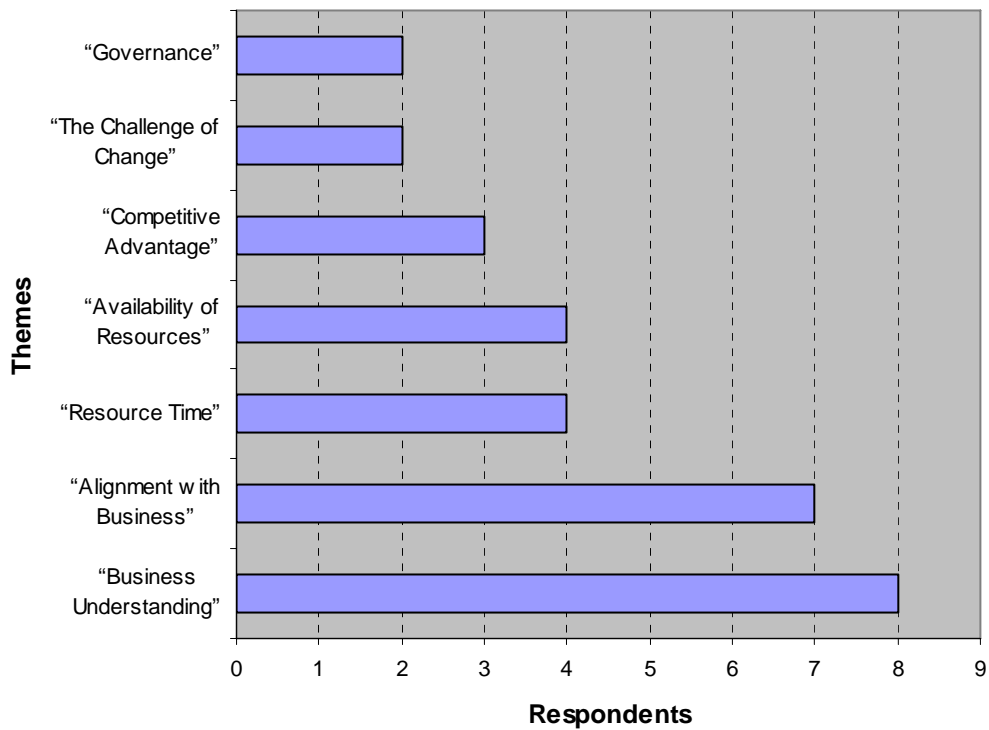


Figure 5.15. Internal Drivers that influence the implementation or evolution of Enterprise Architecture.

5.2.4.3. Question 3: What is the availability of mature EA resources to your organisation?

This question serves to augment the already identified “*availability of resource*” theme identified in section 5.2.4.2 thereby developing a better understanding of how the respondent companies are dealing with the resource concerns. The emerging themes are captured in table 5.3

Rank	Theme	Excerpts from interview	Count	%
1	“Difficult, but its a focus area”	<p>“We have earmarked individuals as possible EA resources. We need to develop them.”</p> <p>“There is definitely a lack of availability of mature resources. It does have a negative impact on EA strategy. However, we are consistently growing our internal skills in this regard.”</p> <p>“Because it is a long term process we want to make use of our own staff. This is not always possible though.”</p>	9	50%
2	“Not a focus area”	<p>“Its difficult to motivate for these resources.”</p> <p>“Business has paid for me to attend EA conferences, but I think this too might be coming to an end.”</p>	3	25%
3	“Source all EA resources externally”	<p>“We are not too concerned; we’ll search externally for these resources.”</p>	2	17%
4	“No concern, they are available internally”	<p>“We have a dedicated team to each area, with executive support. Each team has a set amount of time dedicated to EA, as long as it does not have an impact on growth.”</p>	2	17%

Table 5.3. Availability of mature EA resources to the organisation

As show in figure 5.16, the most common emerging themes relate to the availability of resources is “*Difficult, but it is a focus area*”, with 6 (75%) respondents. The next prevalent

theme is “*Not a focus area*”, with 3 (35%) respondents. Other themes that emerge are, “*Source all EA resources externally*”, and “*No concern, they are available internally*” with 2 (17%) respondents raising this respectively.

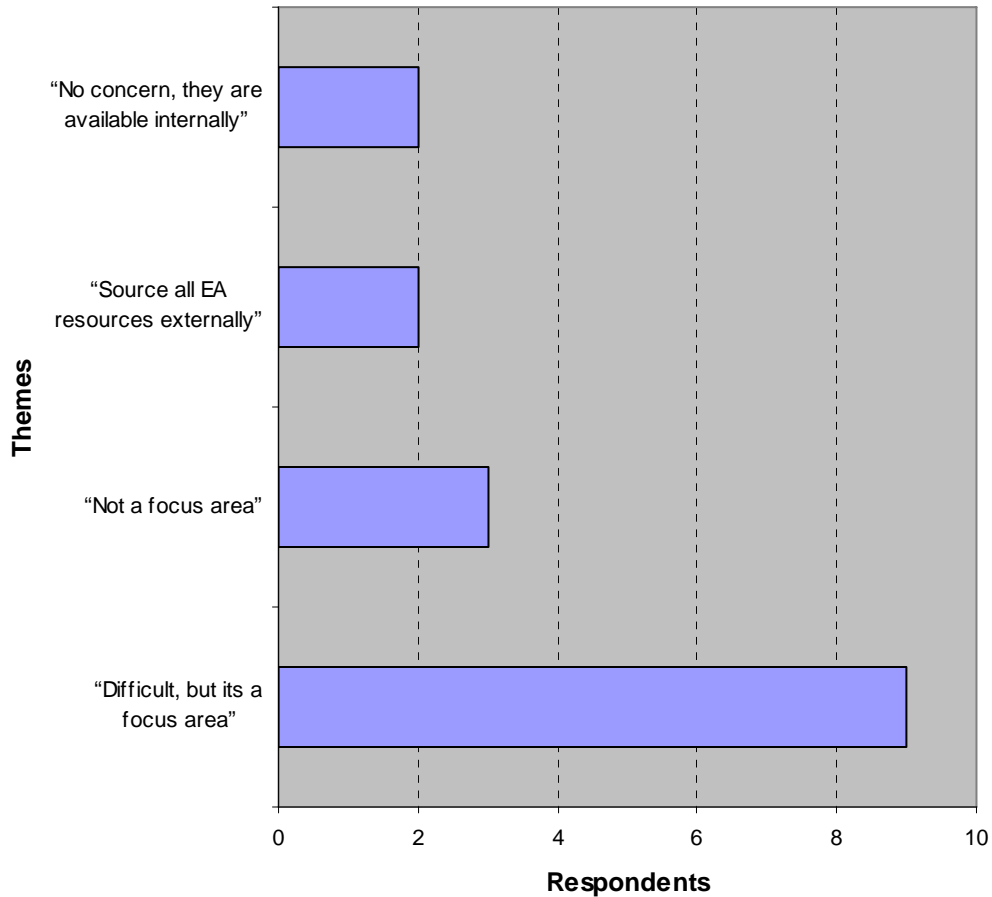


Figure 5.16. Availability of mature EA resources to the organisation.

5.2.4.4. Question 4: What are the software capabilities within your organisation that influence the implementation or maturation of EA

This question serves to understand which factors relating to software capabilities which would impact on the organisation’s ability to implement or evolve EA within the respondent company. The respondent themes, as shown in table 5.4 relate to internal software

capabilities, as well as the software capabilities of clients and 3rd party vendors, which due to the nature of their businesses in some instances, is viewed either an extension of the organisation's capabilities, and a key factor in the organisation's competitive advantage.

Rank	Theme	Excerpts from interview	Count	%
1	"Standardisation is vital"	"Ensure they have standardised systems through a buy-or-build strategy. When we acquire a new business, we are not concerned with interfacing systems. We rip-and-replace." "Minimise the number of technologies used. It's vital that the entire business uses the same type of technology."	10	83%
2	"Good software capabilities"	"We have definitive and licensed software. The systems talk to one another. They are geared with people and software. This is part of our strategic objective."	7	58%
3	"Vendor choices are critical"	"If it is core to our business, we develop it ourselves. We don't want to limit ourselves strategically because of capability limitation by 3 rd party vendors." "We have invested in systems that are very difficult to change."	7	50%
4	"Continuous improvement to prevent legacy"	"May and April are upgrade months, it's a documented and audited process."	5	42%

Table 5.4. Software capabilities that influence the implementation or evolution of EA.

The prevalent theme as shown in figure 5.17 is "*Standardisation is vital*", with 10 (83%) (10) respondents raising this as a key requirement and need. Seven (58%) respondents raise the theme of "*good software capabilities*", suggesting that they are geared to support EA processes. Equally "*vendor choices are critical*", is identified by 7 (58%) respondents. "*Continuous improvement to prevent legacy systems*", is the least prevalent theme, however, it is raised by 8 (42%) respondents.

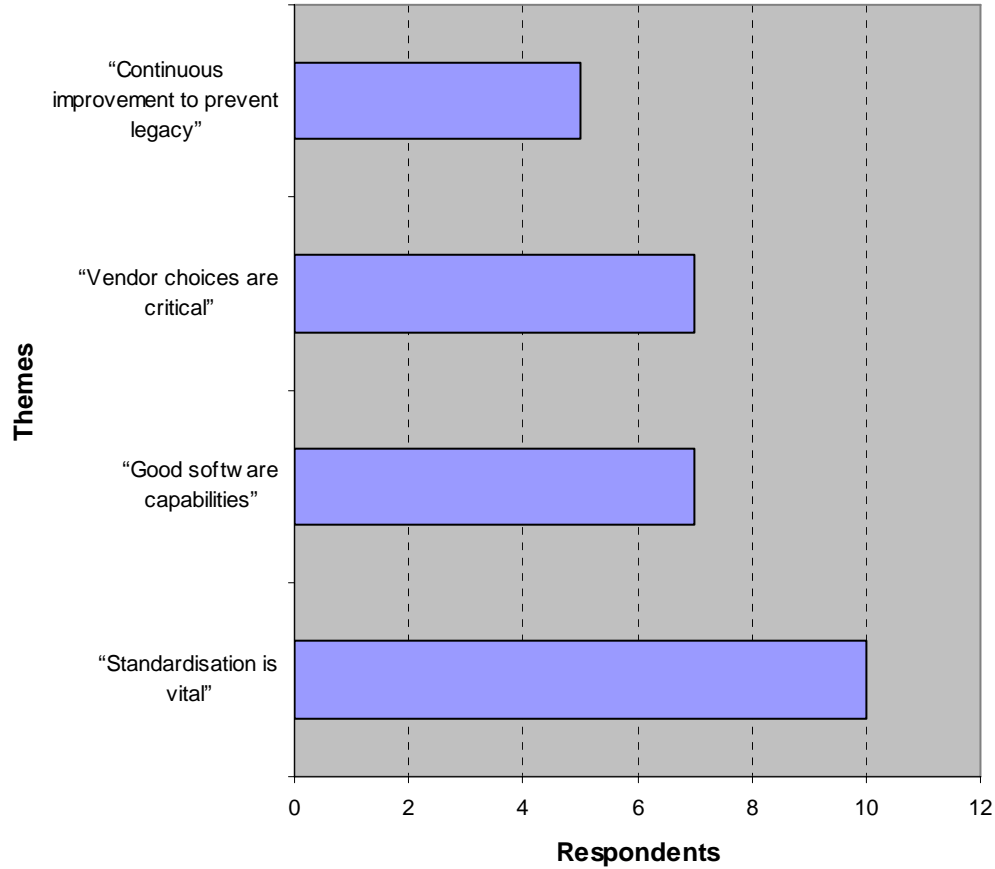


Figure 5.17. Software capabilities that influence the implementation or evolution of EA.

5.2.4.5. Question 5: What are the external factors that influence the implementation or maturation of EA

The question isolates factors outside the respondent's company's control that will influence the implementation or evolution of EA. Respondents are encouraged to address this question as broadly as possible so as to capture as many factors as possible. The emergent themes are detailed in table 5.5.

Rank	Theme	Excerpts from interview	Count	%
1	“Remaining competitive to meet client demands”	“Part of a productisation strategy. We could decide to create new income streams by selling our systems, instead of services.”	8	67%
2	“Legislation”	“We’ve been waiting for almost 4 years for the medicine pricing legislation to be finalised.”	6	50%
3	“Technological advancements”	“Staying up to date with the program requires continuous investment.” “Our clients and vendors are either super advanced or on very old systems. We need to accommodate all of them to remain profitable.”	4	33%
4	“Governance”	“Some of our corporate clients are listed overseas, they comply with tough governance norms, therefore they expect us to comply to their requirements.” “Best practice processes are not always well defined.”	2	17%
5	“Industry bodies”	PHISC (get definition)	2	17%
6	“General shortage of skills in the market”	“There is a lack of South African resources.”	2	17%

Table 5.5. External factors that influence the implementation or evolution of EA.

As shown in figure 5.18, the dominant themes are “*Remaining competitive to meet client demands*” and “*Legislation*” with 8 (67%) and 6 (50%) respondents identifying this as a the most prominent external factors. This is followed by the theme of “*Technological advancements*” relating to the reliance of commercially available applications, with 4 (33%) respondents raising this. “*Governance*”, “*industry bodies*”, and “*General shortage of skills in the market*”, are the least prevalent themes with 2 (17%) respondents each

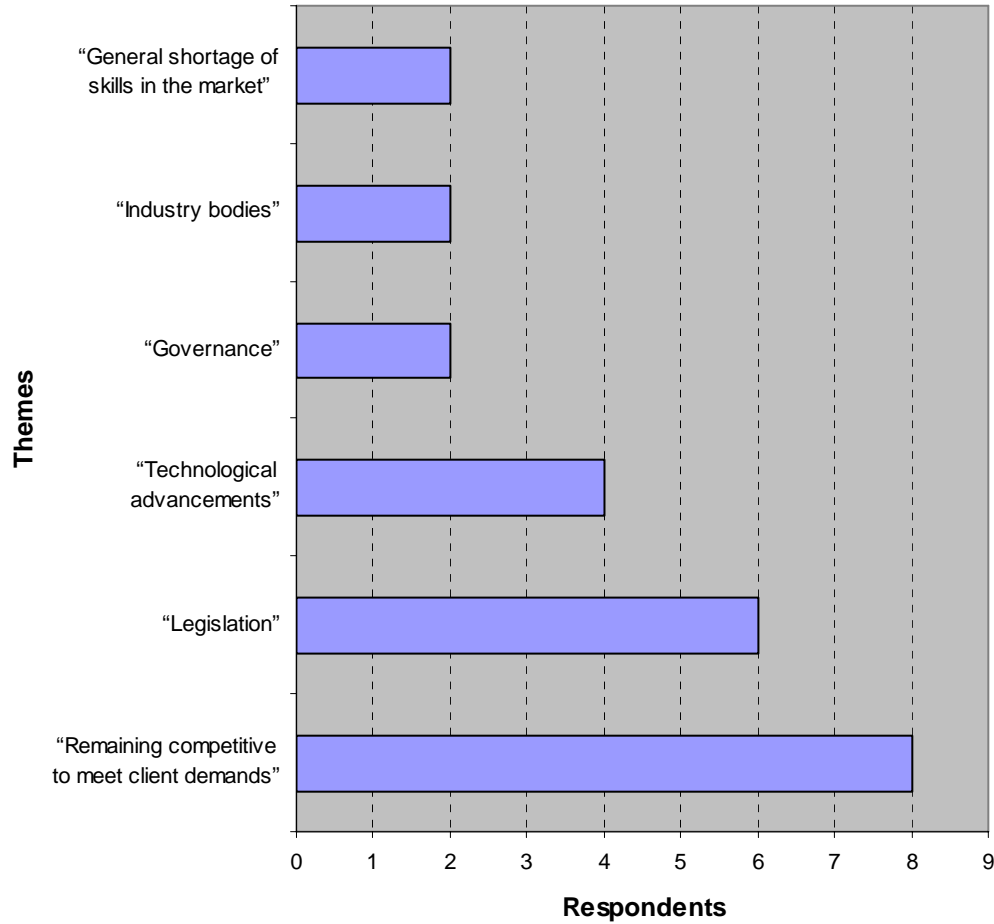


Figure 5.18. External factors that influence the implementation or evolution of EA.

5.2.4.6. Question 6: What are the financial considerations that need to be considered when implementing or maturing EA within the organisation.

After considering both external and internal factors, the influence of financial factors on the implementation of EA, is considered as this may augment the themes already identified in the previous questions. The emergent themes are shown in table 5.6.

Rank	Theme	Excerpts from interview	Count	%
1	“Return-on-investment (ROI)”	<p>“The level of EA is based on the benefit derived.”</p> <p>“Implementation is a once off effort, whereas maintenance is an ongoing cost.”</p> <p>“EA is expensive; therefore it is not viable as a stand alone division. It needs to part of an existing portfolio.”</p> <p>“Effects of EA is already evident but still difficult to quantify, before EA, our approach was restart and rebuild. We lost almost 5 years do this.”</p> <p>“Driven by financial results, and not always strategic management results.”</p>	9	75%
2	“Business efficiency”	“The competitive advantage is now held. We are focussing on efficiencies.”	4	33%
3	“Budget / Cost”	“This is the core of everything that we do.”	3	25%
4	“Trading environment”	“We are in an industry of declining margins.”	2	17%
5	“Risks of liability”	“We have to the consider the cost of not implementing the principles of EA”	1	8%
6	“Time-to-Market”	“Costs are directly proportional to how quick we want to implement this.”	1	8%

Table 5.6. Financial considerations that influence the implementation or evolution of EA

As illustrated in figure 5.19, “*return-on-investment*” is the most prevalent theme with 9 (75%) respondents raising this as a key financial concern of EA. “*Business efficiency*” emerges as a theme with 4 (33%) respondents. The “*Budget / Cost*” and “*trading environment*” emerge with 3 (25%) and 2 (17%) respondents respectively. The least prevalent themes are “*risk of liability*” and “*time-to-market*”, with 1 (8%) respondent each.

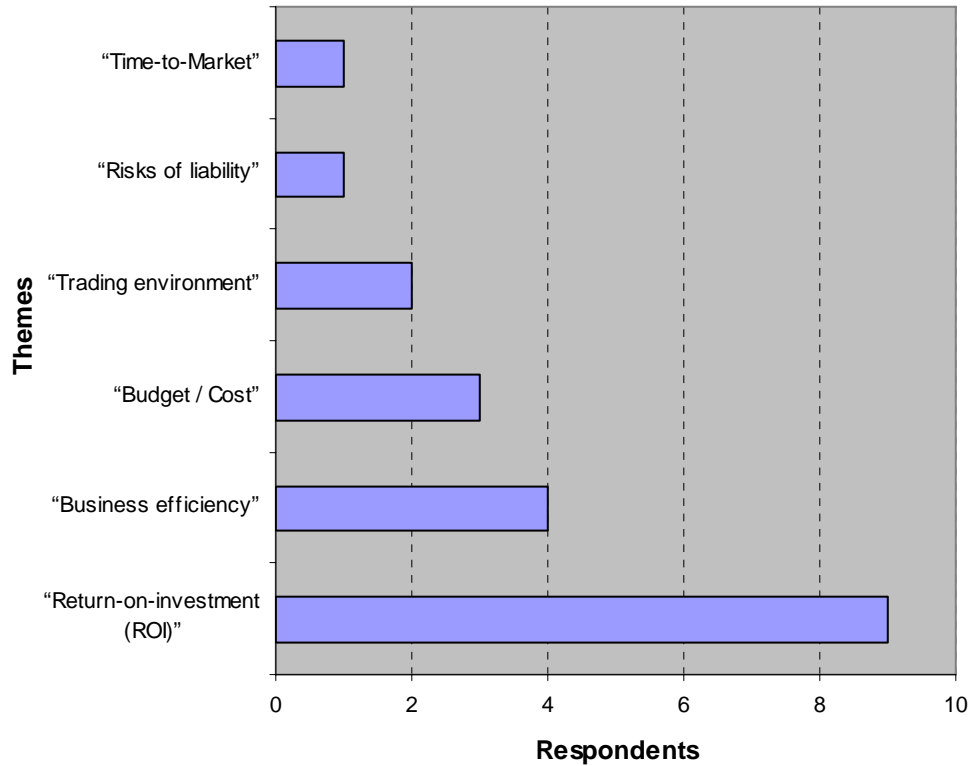


Figure 5.19. Financial considerations that influence the implementation or evolution of EA

5.2.4.7. Question 7: What other critical success factors are important to consider in the implementation or maturation of EA?

This question serves to identify other themes that might have not emerged at this point, but which would play a critical role in the implementation and evolution of EA. The resultant themes are captured in table 5.7.

Rank	Theme	Excerpts from interview	Count	%
1	“Understanding of and alignment with business requirements”	<p>“EA staff needs to have the ability to model and understand abstract business requirements.”</p> <p>“Business horizons are too short; therefore the architecture needs to be agile. It’s the nature of the healthcare space.”</p> <p>Without alignment you have good intent, with bad results.”</p>	8	68%
2	“Staff skills levels”	<p>EA is to be owned by a single point, but it needs to be disseminated to multiple points.”</p> <p>“A company needs the IP and capabilities to execute.”</p>	5	42%
3	“Create understanding at Business level”	“The challenge is to enlighten executive and general management around EA principles.”	5	42%
4	Work within a defined framework / standard	“EA implementation needs to have boundaries. It’s like a box. The contents of the box are loosely defined, but they remain within the context of the box.”	3	25%
5	“Influence over clients and vendor”	“One needs to establish a contained business arena. We need to have the ability to influence clients and market drivers”	2	17%

Table 5.7. Critical success factors that influence the implementation or evolution of EA.

The emerging themes, as show in figure 5.20, indicates once again a re-emergence of themes already identified. The most prevalent theme raised as a critical success factor is, “*understanding of and alignment with business requirements*”, with 8 (67%) respondents. “*staff skills levels*” and “*creating and understanding at business level*” emerge as well, with 5 (42%) respondents. “*Work within a define framework / standard*” and “*influence over clients and vendors*”, are new emerging themes with 3 (25%) and 2(17%) respondents each.

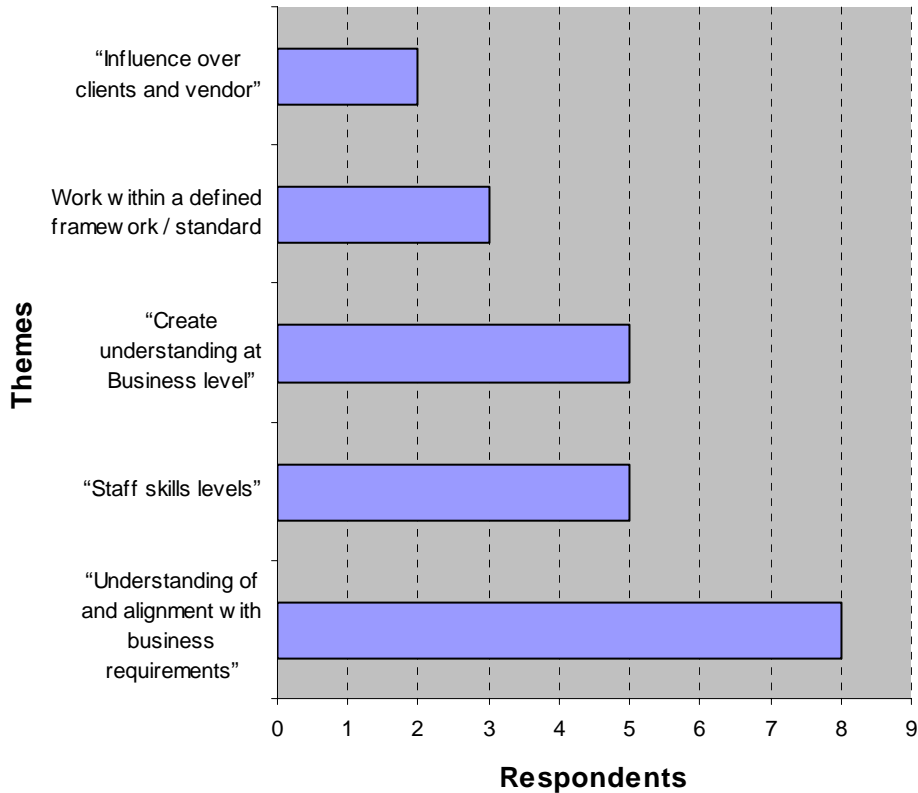


Figure 5.20. Financial factors that influence the implementation or evolution of Enterprise Architecture.

5.2.4.8. Question 8: Do you believe that EA is of vital importance to companies that participate in the South African Private Healthcare services value chain?

This question serves to understand if the respondents have experienced the value of implementing EA within their organisations, and if they had not yet implemented it, whether they saw value in doing so. The resultant themes and associated excerpts are included in table 5.8.

Rank	Theme	Excerpts from interview	Count	%
1	Yes	<p>“With our levels of complexity we could not be successful without the principles of EA.”</p> <p>“Being without EA equals lack of flexibility, scalability and extendibility, which equals lack of longevity.”</p>	11	92%
2	No	<p>“It would not be necessary if the various components of the supply chain cooperated.”</p>	1	8%

Table 5.8. Is EA vital to companies in the Private Healthcare Services sector?

From figure 5.21, it can be seen that 11 (82%) respondents indicate that EA is vital of companies in the Private Healthcare sector with only 1 (8%) “No” response.

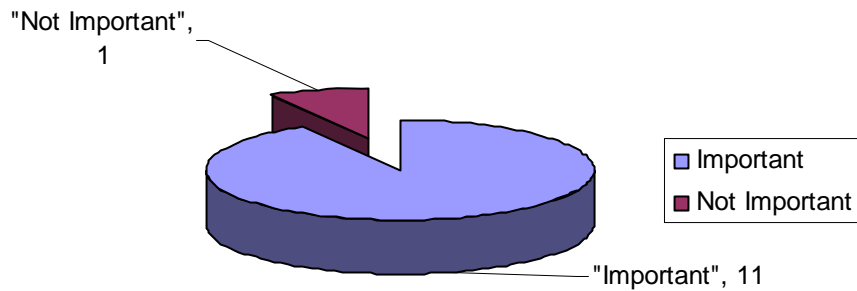


Figure 5.21. Is EA vital to companies in the Private Healthcare Services sector?

5.2.4.9. Question 9: What other factors not yet mentioned could impact on the implementation or evolution of EA within your organisation?

This question serves, as a last attempt to identify any additional factors or themes that could influence the implementation or evolution of EA. No additional comments or views are given, indicating that their views had been addressed in the previous question.

5.3. Chapter Summary

This concludes chapter 5, in which data collected from the empirical phase of this research project is presented. The data gathered during this phase, relates to the following aspects of the respondent companies interviewed:

- IT Demographics of the respondent organisations.
- Enterprise Architecture Maturity Levels:
 - Per element of the EA maturity model.
 - For the entire EA maturity model.
- Findings into the challenges of implementing and maturing EA with an organisation as it relates to:
 - Internal drivers.
 - Availability of mature EA resources.
 - Software capabilities.
 - External factors.
 - Financial considerations.
 - Critical Success factors for implementing EA.

The data collected is done in alignment with the research problem and was both quantitative and qualitative in nature. Significant data was collected through the use of the EA maturity assessment model as well as through the used of the semi structured face-to-face interviews. The data collected allows the research to gain deeper insights into the maturity levels of EA, as well as the challenges associated with implementing or maturing EA within organisations in the South African Private Healthcare service industry.

An analysis will be done into the findings in the next chapter against the background of the non-empirical work conducted in chapter 2.

6. Chapter 6: Discussion of Results

6.1. Introduction

This chapter describes the findings from the data collected during the empirical phase of the research project. The data collected in Chapter 5, related to IT demographics, EA maturity assessments and themes, relating to challenges of the implementing and evolving EA within the respondent companies. In this chapter the collected data is analysed and explored to address the purpose of this research project. Although this chapter commences with a discussion around the IT demographic data, the primary objective of this data is to address the research questions listed in Chapter 3. Phrases are enclosed within quotation marks to indicate verbatim comments made by interviewees. This chapter is structured into 3 main sections with the third section being further structured into four categories identified through the non-empirical phase relating to the challenges to the implementation and evolution of EA within the respondent companies. As discussed in chapter 4, due to the sensitive nature of the information supplied respondents requested anonymity for themselves and their companies.

6.2. Research Question 1: Analysis of IT Demographics

This section serves to better understand the IT demographics of the respondent companies and its relationship with senior management and associated processes, confirming their dependence on IT.

The key demographic findings from the data presented in Chapter 5 are as follows:

- Eighty-three percent (10) of the respondent companies have an IT staff compliment of 51 resources or more (figure 5.2). The largest staff count is associated with a major Medical Scheme Administrator. The enablers of electronic claims processing show a higher percentage of IT staff in relation to the total company staff count.
- The use of IT within the value chain of private healthcare services serves the following purposes:
 - An enabler to the support the business, facilitating a number of efficient business processes. This is true in the context of healthcare providers and medical schemes. This is characterised by a lower percentage of IT resources (both permanent and on contracts) relative to their total staff count.
 - Income generator through the design and development of IT products used by participants in the private healthcare service value chain. This is true for enablers of electronic claims processing, which generate their primary income this way. This is characterised by a higher percentage of IT resources (both permanent and on contractors) relative to their total staff count. In some instances the IT resource count ranges between 35- 45% of the company's total staff count.
- One hundred percent (12) of the respondent companies indicate that IT is “very *important*” for sustaining its day-to-day operations. This was irrespective of the company's sector within its value chain, annual turnover or IT resource complement. Matthee, *et al*, (2007), indicated in the South African study into EA in the financial services sector also showed a high dependency on IT.

- Ninety-two percent (11) of the respondent companies indicate that IT was “*very important*” to enable growth and achieve the organisations strategic objectives. The one respondent company that rated IT of “*high importance*” (a lower level of importance), was also identified as having the lowest IT resource count. The importance of IT in the respondent companies concurs with the findings of Mohrmann and Kropf, (2007), who suggest that the growing trend amongst healthcare companies is to increase their IT capabilities to remain competitive.
- Although 67% (8) respondents indicate “Yes” to the presence of a formal IT strategy committee or IT council responsible for reviewing all major IT investments, the balance of the respondent companies 33% (4) state that although there was not a formal IT strategy council or committee overlooking and deciding on IT investments, the responsibility is held at managerial level and approved by executive management. One of these exceptional respondents also presented the smallest IT resources count.
- One hundred percent (12) of the respondent companies indicate that their company’s IT strategy is influenced by their Board / Exco’s business objectives in one way or the other (figure 5.4). Only 1 respondent company indicated that although the Board / Exco influenced the IT Strategy, their influence is only “*partial*”. Van der Klashorst (2001) supports this view indicating that IT “spend” is determined by strategy which in turn is determined by the business leaders. They directly influence the IT strategy.
- As illustrated in figure 5.6, 42% (5) of the respondent companies “*fully Agree*”, that the Board / Exco understands the strategic value of IT while 58% (7) “*agree somewhat*”.

This raises valuable concerns; due to the fact the companies agreed 100% that IT is “*very important*” to their business operations, yet only 42% of the Boards/ExcOs have a full understanding of the strategic value of IT. Ross *et al.* (2006), indicate that this is of vital importance. Failure of business to understand the value of IT and or EA, impacts on the ability to leverage from these initiatives.

- Conversely, in order to successfully participate in addressing the company’s business objectives, IT would need to fully understand the business needs of the organisation (Ross *et al.*, 2006). The results as illustrated in figure 5.7, indicate that 83 % of the respondents claim that IT understands the organisation’s business needs “*To a large extent*”, while 17 % claim “*to some extent*”. Companies that indicate IT’s understanding of the business objectives as being “*to some extent*” highlight that they recognise that this was not optimal and that one of their focus areas was to improve the alignment between IT and Business to ensure a maximised understanding. This is identified as a key requirement for and benefit of, implementing EA (Van der Klashorst, 2001; Ross *et al.*, 2006).
- As per figure 5.8, none of the respondent companies have a CIO or senior IT manager reporting directly to the board. This is key requirement of EA and is an indication of maturity. Companies that have a higher EA maturity can be typified as the board being responsible for extracting value from the EA (Matthee, *et al.*, 2007; Schekkerman, 2005). Ross *et al.* (2006) highlights board involvement as important.
- Only 42% (5) respondents companies Board / Exco indicate that their ability at getting assurance on the performance of IT and on the mitigation of IT risks, is “*very good*”. 50% (6) respondents companies indicated it was “*good*”, whereas one indicates it is

“adequate” (figure 5.9). A high level of surety is required to ensure that business understands the IT capabilities. This could be related to the fact that, as per figure 5.8, the most senior IT manager does not report directly to the board (Schekkerman, 2005; Ross *et al.*, 2006; Mathee, *et al.*, 2007).

- Figure 5.10 reveals that although 100% (12) of the respondent companies embraced and made use of the principles of EA, only 42% (5) of the respondent organisations made use of a formal EA framework. Structure and formal framework are a key requirement for successful EA implementation. Cost and time are cited as reasons for this. The respective companies claimed that they either created their own formal company specific framework or utilise a number of components or elements across a number of frameworks. This supports the findings of Schekkerman (2005) and Mathee *et al.* (2007), in that not all companies make use of formal frameworks. Zachman (1996b) adds to this stating that the principles of EA are framework neutral, while Hagan (2004) supports the view that EA may exist within a formal framework, or that the same framework can be used across a number of companies.
- Figure 5.12, revealed that 42% used a combination of existing EA frameworks, citing Gartner and Zachman, whereas, 25% indicated the implementation of a “*company Specific*” EA framework that addressed the specialised needs of their organisation. One respondent indicated the use of an “*existing framework*”, with the balance, 25%, of respondents indicating the use of “components” of EA frameworks. This concurs with the findings of Schekkerman (2005) and Mathee *et al.* (2007). Ross *et al.* (2006) adds that all companies have EA, irrespective of a formal framework being present.

- Of value to highlight is that the respondent company with the largest IT resource count, highest turnover bracket, and considered number “1” in its respective sector of the healthcare value chain, indicates that they have developed a framework that is focused on what they viewed as their own specialised needs. Hagan, (2004) and Schekkerman (2005), identified companies that had developed their own EA frameworks to meet their specialised needs.
- One hundred percent (12) of the respondents indicate that the EA process was ongoing (figure 5.10). 92% (11) respondent companies indicate that they have implemented the principles of EA more than 1 year ago, with 46% (5) of those in turn having implementing it more than 3 years ago. This is indicative of organisations that have recognised the value of EA in a highly competitive environment and are focussed on removing legacy system from their organisations. Interestingly, the respondent that has implemented the principles of EA less than a year ago, relies on IT as its primary income generator. The respondent companies that have implemented EA more than 3 years ago, were 1 provider of healthcare services, 2 enablers of electronic claims processing and 2 medical scheme administrators. Kamogawa and Okada (2005) highlight that EA is an ongoing process that evolves over time improving with operation and management discipline.
- According to figure 5.11, 58% (7) of respondent companies use their “*own resources*” to implement EA, whereas 42% (5) of the respondent companies use a “*combination of both internal and external resources.*” Two respondent companies that implemented EA with their own resources fall into the category of being either number “1” or number “2” within their respective sector of the private healthcare value chain. Results of the studies conducted by Matthee *et al.* (2007) and Schekkerman (2005) indicated that

international and South African financial services sector companies use their own resources for the functions related to EA, developing them internally.

- The implementation of EA was seen as “difficult” by 67% (9) of the company respondents, as shown in figure 5.12. The 25% (3) that experienced their EA implementation as being “easy” indicate that it was due to them having only started the process recently (2 respondents) or that they had only implemented small components of the EA principles.

6.3. Research Question 2: Enterprise Architecture Maturity Model analysis

EA maturity is assessed using the IFEAD extended EA maturity model, described in section 2.5.2. It indicates the respondent company’s EA maturity and identifies at a high level the practices on which the organisations needs to focus in order to achieve the greatest improvement and the highest ROI on their EA (The Open Group, 2007; Schekkerman 2006). Maturity of the individual elements of the EAMM model is also assessed. The table 5.1 reflects both the overall EA maturity and EA maturity of the individual elements. This data is to be analysed in conjunction with the data collected in table 5.8. This results of this research question are assessed with the findings listed in table 5.8.

Ninety-two percent (11) of the respondent companies indicate that EA was vital to companies in the South African private healthcare services industry (Figure 5.21).

“Being without EA equals no lack of flexibility, scalability and extendibility, which equals lack of longevity.” (Respondent # 9)

A number of authors concur with this citing flexibility and scalability as a key reason for implementing EA, with a benefit of rooting out old legacy systems. Van der Klashorst (2001); Puschmann and Alt (2004); Varghese and Kurien (2004) and Schekkerman, 2004) concur with this finding.

The one respondent that indicates that is EA was not vital, suggest that EA would not be necessary if the various components of the supply chain cooperated with one another. Ross *et al.*, (2006), cites this as the exact reason for the attractiveness of EA. This respondent attained a “*level 1*” EA maturity.

Evident in table 5.1 the highest EA maturity is “*level 2*” (Under Development), with “*level 0*” (No Enterprise architecture) being the lowest. The mode, being the most frequently occurring level, is “*level 2*”. What is of vital importance to note that if entire description of the EA criteria is not met for a core element or for the combined elements of the maturity model, the organisation is assigned to the next lowest stage of EA maturity. Therefore what is evident is that companies that have a “*level 0*” maturity, show higher levels of maturity in other elements of EA, e.g. respondents 5, 11, and 12, have an overall EA maturity rating of “*level 0*”, due to attaining a “*level 0*” for the element of “*Architecture Program Office*”. The reason offered:

“We do not have the resources or the ROI to justify the establishment of a formal architecture program office. The responsibility is allocated to one of the managers when required.” Respondent # 5

Respondent 5 subsequently attained a “*level 3*” rating for 3 elements of the EA maturity model, with respondents 11 & 12 achieving a “*level 2*”, for 3 elements of the EA assessment model. It can therefore be said that the principles of EA are evident in all the companies that are surveyed, irrespective of turnover, sector (within the private healthcare value chain) or size of the IT department. Matthee *et al.* (2007) agrees, stating EA is prominent in both large and small companies, and concurs with the findings of this research project stating that EA maturity is not higher in the larger companies in comparison to smaller companies. These results, however, disagree with Schekkerman (2005), who suggests that maturity levels are higher in larger companies compared to smaller companies. EA maturity results for this research project indicates that higher maturity levels are not exclusive to the larger companies, with a higher IT resource count and turnovers. In addition to the above the following analyses is deduced from table 5.1:

- The results indicate that not all the companies within the private healthcare service industry are on the same EA maturity level. This is demonstrated by Matthee *et al.* (2007), in an assessment done into the South Africa financial services sector.
- The mode (*level 2*) indicates a medium to low level of maturity for the participant companies. Companies in the South African financial services sector, which also have a high dependency on IT, were also identified as having a low level of maturity (Matthee *et al.*, 2007).

In conclusion, it can be said that EA exists, and that it is a vital to companies that participate in the South African private healthcare service industry. The reasons given for its added value is confirmed by the body of literature cited in chapter 2. It can be further said that the maturity levels of EA within this industry are not dependant on the size or turnover. The literature agrees with these views in the context of South African, but

disagrees with it from an international perspective. Although the companies have implemented the principles of EA in some instance that have focused on specific elements of EA, implementing and developing those, whilst not equally addressing less (perceived) important elements of EA (from the company's needs perspective). The literature lends supports to this view, in that the implementation of EA does not necessary have to be associated with an existing formal EA framework, but could rather be a combinations of frameworks or specialised company focused EA. It could be said that organisations which have implemented their own specialised EA frameworks, may have excluded EA elements they perceive not to be of value, such as, the establishment of the architecture program office. This would in essence have an impact on the overall EA maturity assessment, which is founded on testing for the elements of a formal EA framework. Special cognisance should be made of this when addressing a company's EA maturity levels, as it may not be a true reflection of the company's specialised EA processes.

6.4. Research Question 3: Internal company elements

What are the internal company elements that influence or could potentially influence the implementation or evolution of an EA in South Africa private healthcare services sector?

Internal elements can be translated as factors that hinder the implementation or evolution of EA within the company or factors that could be improved or eliminated through the use of EA principles. This in turn becomes a driving force motivating the implementation of evolution of EA within a company.

"Business Understanding of EA" was the most prevalent internal element identified by the respondents (Frequency = 8 respondents). Respondents indicated that due to lack of

business understanding of EA and its benefits, leads to a polarised view of EA. It is either perceived as the ultimate solution for the company's challenges, or conversely viewed as a "fun activity" to be relegated to the IT department in their spare time. This is viewed as negative. It impacts negatively on the implementation of EA and its evolution. Lack of business understanding results in EA either not being supported by a company wide process or it is expected to delivery immediately visible and unreasonable results.

"It's (EA) seen as a fun thing that you do in your spare time, as a break from normal work." Respondent # 5

This is vital, as it indicates that business is not fully aware of the benefits that can be derived from EA as stipulated by Kamagawa and Okada (2005); GAO (2003) and The Open Group (2007), being that EA is a business catalyst, driving and supporting business, through business process excellence, facilitation of innovation, and strategic adaptability. Ross *et al.* (2006); Van der Klashorst (2001); Puschmann and Alt (2004); and Hagan (2004) support this view indicating that EA has a proven track record in ensuring a sustainable business advantage, with clear benefits and value. Recognition of these benefits could be seen in the respondent that raised the "*competitive advantage*" theme (frequency = 2). The presence of this theme could be seen as a driver to the implementation of EA.

"Alignment with Business", was the next most prevalent theme (Frequency = 7). This is seen as an internal business need that would positively drive the implementation and evolution of EA. This is significantly prevalent with respondent companies that have a global strategy or are growing through acquiring other businesses. Zachman (1996a),

views this as a key benefit of EA, allowing proactive, effective planning and deployment of IT resources in order to respond timeously to the needs of the business environment.

“Resource time” and *“Availability of resources”*, are both prevalent themes (Frequency = 4). These themes can be linked to the *“Business Understanding”* theme, suggesting that once business understands the value of EA, *“time”* and *“resources”* will be allocated to EA initiatives (Van der Klashorst, 2001). Until that understanding is developed, it is viewed that the availability of resources and resource time will remain a significant challenge.

“As soon as business developed an understanding of EA, dedicated time was allocated to the EA resources, away from day-to-day operations to focus on IT.”

Respondent # 9

In some instances the limited availability of resource time for EA activities is due to the state of constant flux the private healthcare industry finds itself in.

“Our time is limited. We are expected to change the Boeing’s engines while it is still in flight.” Respondent # 8

“Availability of Time is critical. It’s an continuous attempt to meet long term business objectives and strategies without compromising day-to-day expectations.”

Respondent # 5

The *“availability of resources”* theme was investigated in more detail with the respective results listed in table 5.3. It appears again in context under external considerations in

table 5.5, as “*General shortage of skills in the market*” (frequency = 2) and then once again in table 5.7 as a critical success factor in the context of “staff skills levels” (frequency = 5).

“Its difficult to find resources that can just step into a function. They usually have to evolve with the system.” Respondent # 9.

The shortage of resources is seen as a critical internal factor which needs to be addressed. This problem is perceived to be global, raising concerns about the sustainability of EA projects. Schekkerman (2005), opposes this view indicating that where EA is prevalent (with a high maturity), companies develop and retain their own internal EA resources. As per figure 5.16 and table 5.3, the prevalent theme (frequency = 9) relating to the availability of mature resources, is “*difficult but a focus area*”. These respondents indicate that they are focused on developing EA resources internally to overcome the resource constraints.

“We have earmarked individuals for EA. We now need to develop them.”
Respondent # 4

This approach concurs with the findings of the 2005, “*Trends in Enterprise in Architecture*” web survey (Schekkerman, 2005). The resultant benefits of EA can once again present the solution to the EA resource concern, in that resources tied up due to the presence of legacy systems, could be freed up through the implementation of EA principles (Varghese and Kurien, 2004; Van der Klashorst, 2001; Zachman, 1996a). Van der Klashorst (2001) adds to this indicating that resources are like asset management. They are distributed to and focused on areas where the best value lies. This speaks once again to the importance of ensuring business understanding of the benefits and positive ROI of EA.

“*Available internally*” was the least prevalent theme (frequency = 2), however it seems that some organisations are focused on changing this in order to have their own internal EA resources.

“EA resources are best sourced and developed internally as they then develop a working understanding of the organisation, its processes and systems, including legacy systems. Sourcing external resources is slow and expensive.” Respondent # 9

In conclusion, “*business understanding*”, “*availability of resources*” and “*resource time*” present themselves as three prevalent themes that could negatively influence the implementation and evolution of EA. These however could be addressed through creating and developing increased business understanding of EA. The value and benefits of EA is well documented in the body of literature presented in chapter 2, however, it is of no benefit unless the value add of EA is clearly understood and embraced by business. This could be linked to a variety of reasons, including the fact that EA initiatives report into senior management, remaining at arms length from the board. The concern regarding the availability of resources and resource time is being addressed in accordance with international trends. It remains, however, a hindrance to the implementation of evolution of EA. “*Alignment with business*” and “*competitive advantage*”, although prevalent, are drivers promoting the implementation of EA, and will not hinder EA or its evolution. The emphasis is, therefore, placed on the need for business to understand the value and capabilities of EA to unlock the themed benefits.

6.5. Research Question 4: Software Capabilities

What are the software capabilities within the organisation that influence or could potentially influence the implementation or evolution of an EA?

The emergent themes relating to software capabilities that influence the implementation and evolution of EA, include the company's internal software capabilities, as well as those of its 3rd party software vendors and clients. Its software capabilities together with its choice of 3rd party vendor and ability to integrate with clients is a key competitive differentiator for companies in this sector. The most prevalent theme in this instance is “*standardisation is vital*” (frequency = 10)

“Minimise the number of technologies used. Its vital that the entire business uses the same type of technology.” Respondent # 1

Mecer (2001) concurs with the prevalence of this theme indicating that a barrier to implementation success of IT in the healthcare service industry, is the lack of standardisation. This is not only a key requirement for implementing, it is also one of the resultant benefits of implementing EA, resulting in the desired levels of integration and standardisation (Tiku *et al.*, 2007; Ross *et al.*, 2006; Puschmann and Alt, 2004; Pulkkinen, 2006).

“*Good software capabilities*”, was the next most prevalent theme (frequency = 7) in that the respondents indicate their removal and prevention of “legacy systems” ensuring that the “systems talk to one another”. This was part of their strategic objective and facilitated by the use of EA. This view is supported by Van der Klashorst (2001), who suggests that

the implementation of strategic processes are supported by the company's IT capabilities. This would include an element of software. This was augmented by the *"continuous improvement to prevent legacy"* theme (frequency = 5), which indicated that there is a firm focus through strict controls to identify and prevent legacy systems from reoccurring. This is seen by the respondents as vital to maintain a competitive advantage.

"Across the country and globally, to avoid legacy you need to practice strict central control". Respondent # 2

"It's not just about preventing legacy, it's about remaining competitive".
Respondent # 10

Schekkerman (2005) supports this theme indicating that international organisations identify the transformation of legacy, as a key planning component for their EA projects. Varghese and Kurien (2004) augment this by concurring that the continuous improvement of systems is vital to avoid the creation of legacy systems, which in turn are characterised by depleting application know-how (resource constraint), expensive maintenance and rigid architecture, costing the organisation its competitive advantage. This leads to a vital component of the companies software capabilities, which arose as a theme.

The *"vendor choices are critical"* theme compliments the theme of *"standardisation"* because the vendor of choice is seen as an extension of the company's software capabilities, either hindering or enabling it.

"Vendor choice significantly influences the pace & ability to implement EA".
Respondent # 8.

*“The end product is defined by the technology deployed across the organisation.
Its also assists in understand the availability of escape routes”* Respondent # 9

The above mention themes need to be analysed in conjunction with critical success factor theme identified in table 5.7 and show in figure 5.18, being “*technological advancements*” which require the respondent companies to be “on-top” of new technologies and software. This has an impact on the choice of vendors, which in turn affects the company’s software capabilities.

“As a company we are faced with having to deal with new databases, business rules and different technologies.” Respondent # 1.

In summary, key factors influencing software capabilities cannot be viewed in isolation. Standardisation, the prevalence or prevention of legacy systems, the choice of vendor systems and staying up to date with new technological advancement, are interlinked components having an influence on each other. The need and benefits of software and system standardisation is supported by the body of evidence collected in chapter 2. In addition to standardisation of systems, it is vital that companies are focused on continuous improvement to avoid the reoccurrence of legacy systems through an active and focused strategy. Standardisation is both a requirement and a benefit. It is of vital importance to note that ultimately the decision to implement such a strategy would be enabled by the “business’ understanding” of such a process.

6.6. Research Question 5: External factors

What are the external factors that influence or could potentially influence the implementation or evolution of an EA?

The most prevalent theme is, *“remaining competitive to meet client needs”* (frequency = 8). The context of this theme relates to meeting demands from clients and market drivers from a business and technological perspective to enable the company to retain and grow its market share and revenue streams. It speaks to addressing customer needs proactively through the delivery of new services and products.

“High quality servicing is expected throughout the world irrespective of where products are based. A more technically aware consumer base means that IT solutions have to be up to date to provide technically efficient and readily available servicing options for consumers.” Respondent # 12.

“Vital component of superior customer service levels, especially when it’s your only differentiator.” Respondent # 9.

This view is supported by Van der Klashorst (2001); Bernus *et al.* (2003); and Ross *et al.* (2006), stating that organisational metamorphosis is required in an increasingly competitive and changing environment being catalysed by new information and market dynamics in order to make the business thrive throughout its lifespan. Kamogawa and Okada (2005), concur that EA results improves strategic ability, enabling companies to responding to client demands through improved business process excellence which in turn

facilitates superior customer service. This would be a key external factor that would influence the implementation and evolution of EA.

“*Legislation*” is the next prevalent theme (frequency = 6). Although legislation is viewed by Schekkerman (2005), as influencing the increased adoption of EA, the “*legislation*” referred to by the respondents does not relate to the statutory compliance requirements for EA. It relates to legislation governing the private healthcare industry, which has introduced new challenges to the industry (CMS, 2006). The impact of legislation is far reaching in that it places the private healthcare industry under increased pressure to secure its commercial viability. Matthee *et al.* (2007) cites business and the impact of market legislation as a driver of increased business awareness of EA

“We are in an industry of declining margins.” Respondent # 8.

The emergent theme “*governance*” (frequency = 2) relates both to statutory and non-statutory industry bodies organisation representatives of the private healthcare sector tasked to drive standards, e.g. Private Health Industry Standards Committee (PHISC); and governance requirements of the council for medical schemes, COBIT, trustees, clients and internal auditors. Matthee *et al.* (2001) concurs that the governance requirements of COBIT has been a driver for the implementation of EA.

Theme relating to skilled resources emerges again, as “*general shortage of skills in the market*” (frequency = 2). This theme has been discussed under section 6.4.

External factor themes are dominated by the need to remain competitive, which is achieved through the benefits of EA, as a result of the achieved strategic agility. This is a

significant challenge in the context of the other external considerations, i.e. “*legislation*”, which has created a difficult trading environment, creating significant pressure on company profitability, but which also call for the promise of a positive ROI achieved through the implementation of EA.

6.7. Research Question 6: Financial considerations

What are the financial considerations that need to be considered in the implementation or evolution of an EA?

The most prevalent theme in the context of financial consideration is “*understanding the Return-on-Investment (ROI)*” (frequency = 9), and after “*standardisation is vital*”, it is overall, the most common stand-alone theme (“resource” related themes are the most common with a combined frequency of 15). It can be analysed in the context of the “*Business understanding*” discussed under section 6.4, in that if the ROI is clearer business might better embrace the benefits of EA. This theme is identified as one of the largest challenges to the implementation and maturation of EA, and can be analysed together with the theme, “*budget/cost*” (frequency = 3) ,as well as, “*trading environment*”, which highlights the significant challenges the private healthcare services industry to remain commercial viability.

"A component of EA is standardisation. This allows for easier staff movement around projects, departments, and functions. This in turn leads to improved staff retention, which in turn leads to improved productivity and retention of institutional knowledge. This is a reality of EA, but how do you quantify this value. The Effects

of EA is already evident but still difficult to quantify, before EA, our approach was, restart-and-rebuild. We lost 5 years doing this." Respondent # 9

"There is an increased pressure to reduce non-healthcare costs" Respondent # 10

Ross *et al.* (2007), concurs with this concern indicating that the ROI is a key consideration when implementing EA, with many organisations having questioned this, perceiving EA as being the ivory tower of IT. GAO (2003) suggests that this concern is valid and that organisations should understand the ROI before attempting the expensive and timeous process of implementing EA. Schekkerman (2005) concurs with this view point indicating that although the value of EA is evident, it remains difficult to quantify. There is, however, sufficient evidence in the literature to indicate that EA has an unquestioned ROI, praising its value and benefits. If implemented successfully, it leads to higher profitability, facilitated by an increased competitive advantage, which in turn is related to efficiencies, flexibility and improved *"time-to-market"*, a key requirement of IT companies that are reliant on IT to generate an income (Puschmann and Alt, 2004; Hagan, 2004; Van der Klashorst, 2001). The body of literature in chapter 2 cites the beneficial ROI of EA, due to the reduction in complexity, long terms cost reductions, improved time-to-market, improved flexibility and therefore improved strategic ability (Bernus *et al.*, 2003; The Open Group, 2004; Puschmann and Alt, 2004).

"Business efficiency" is the next prevalent theme (frequency = 4). Varghese and Kurien, (2004) concur with the findings indicating that IT efficiency is the corner stone of EA. The resultant effect is an increased business efficiency, increased agility, strategic adaptability and reduced production costs. Hsiao (1995), agree with the finding from the perspective

of the private healthcare market indicating that business efficiency is a key focus area for a sustainable private healthcare sector.

“Risks of liability” and *“time-to-market”* are the least prevalent emergent themes (frequency = 1) in the context of financial considerations. It, however, has a greater impact when viewed together with previous themes, being *“governance”* and *“remaining competitive to meet client needs”* discussed under section 6.6.

In summary, the need for a positive ROI was the most prevalent theme in the context of financial considerations. This is aggravated the by fact that industry’s margins are in decline, with ever increasing pressure to reduce non-healthcare costs, which are mostly associated with IT spend. Although the literature show strong evidence of EA positive ROI, sceptism prevails. It is viewed that an ability to secure a positive ROI from EA, could augment (or be supported by) an improved business understand, which in turn would drive and internal company strategy address the resource and legacy systems constraints that make the implementation and evolution of EA a challenge. The irony remains that, should EA be implemented effectively based on a sounds foundation for EA execution, the effect would be the opposite of the financial concerns that currently prevail. The positive effect would address the challenges identified to the implementation of EA, part of the success and benefits of EA.

6.8. Chapter Summary

The data collected during the empirical phase of this research project and recorded in chapter 5, was analysed in this chapter. It revealed that EA and its maturation in the South African private healthcare sector is faced with similar challenges as noted by other industries in the South African and International context. It however faces its own unique set of challenges, due to the dynamics of the industry, the unsettling legislation legislative environment, declining margins and a perceived overall shortage of skilled resources. The prevalent stand-alone themes or combination of related themes, highlights the key factors challenging the implementation and evolution of EA within the South African private healthcare service industry. These are the availability of resources and resource time; system standardisation; the need for a positive ROI; business understanding of EA; removal of legacy systems; and legislation. In chapter 7, final conclusions, recommendations and areas of possible future research will be discussed.

7. Chapter 7: Conclusion

7.1. Introduction

This chapter addresses the main research problem as outlined in Chapter 1, as well as the associated research objectives which in turn were addressed through the results of the non-empirical and empirical phases of this research project. The results from the various phases of research have been presented in Chapter 2 (non-empirical findings), Chapter 5 (empirical findings) and Chapter 6 (empirical data analysis). This chapter will make recommendations to the stakeholders of this research, based on the findings and finally make recommendations for future research.

7.2. Main Research problem

The main research problem that this research project addressed is “What is the maturity Enterprise Architecture and the associated challenges to its evolution in the South African private healthcare service industry.” This was addressed through the research objectives discussed in chapter 1, which were in turn investigated through the research questions listed in Chapter 3. The extent to which the research problem will be addressed is determined by the extent to which the research objectives were answered. The research objectives were:

- Understanding vital IT demographics of the major organisations that participate in the private healthcare service industry to assess whether IT is a vital and strategic component of their organisation.

- To identify the maturity levels of Enterprise Architecture of organisations that participate in the private healthcare service industry, and
- To understand and identify the possible factors that influence or could potentially influence the implementation or evolution of Enterprise Architecture at organisations that participate in the private healthcare service industry.

7.2.1. Research objective 1: Understanding vital IT demographics

The first research objective as mentioned in section (1.4), served in understanding vital IT demographics of the major organisations that participate in the private healthcare service sector, thereby assessing whether IT is a vital and strategic component of their organisation.

The IT demographics of the major IT companies were detailed in Chapter 5 and analysed in Chapter 6. It served to conclude that IT is seen as vital and strategic component of the organisation. This concurs with the non-empirical phase of the research indicating that the South African private healthcare service industry is well developed and highly dependant on IT. IT is seen as being very important to organisations in this industry allowing them to sustain their day-to-day operations without losing perspective of their strategic objectives. Although not all the companies have a formal IT strategy committee to review all major IT investments, the process becomes the responsibility of senior management. In all instances the CIO or most senior IT person does not report directly to the board, but rather to the executive management. According to Schekkerman (2005) and Matthee *et al.* (2007), this generally relates to lower enterprise architecture maturity levels. Company Boards and executives teams, however, do not see this as a concern, showing confidence in their ability to get assurance form IT regarding it performance and on the mitigation of risk. Conversely, IT departments understand, and are to a large extent, aligned with the

In summary it can be said that IT is a critical component for companies that participate in the private healthcare services sector. On this note, it must be noted that Mercer (2001), suggests that although, the IT dependency is high in the healthcare service industry, IT investment into new technologies is considered to be conservative. This concern is to be revisited when addressing the challenged to the implementation of EA, at companies, within this industry.

7.2.2. Research objective 2: Enterprise Architecture maturity assessment

This research objective served to indentify the maturity levels of Enterprise Architecture in organisations that participate in the private healthcare service sector.

From the empirical analysis, it can be concluded that EA does exist, in the major companies that participate in the private healthcare service industry. It has been implemented through various instruments being; the use of a formal documented EA frameworks, such as TOGAF's and Zachman's framework; the use of a specialised company EA frameworks, designed to meet the company's specialised requirements or through the implementation of key elements of a formal EA framework or combination of frameworks. EA maturity levels, according to IFEAD's extended EAMM, ranged from "*level 0*" (no EA) to "*level 2*" (under development), with the most frequently occurring or repetitive EA maturity level (mode) being "*level 2*". These findings concur with the EA maturity levels in the South African financial services industry, which were deemed as being low. It was, however, concluded that the low EA maturity levels can be attributed to the fact that companies have omitted elements of the EA frameworks; resulting in a low EA maturity assessment. The research concluded that companies with a "*level 0*" EA maturity for certain EA elements could not justify the financial investment required to comply with requirement of those elements, rather focusing on components of the EA framework,

which was deemed to be of great strategic and financial value from a ROI perspective. An example of this is the EA element that requires the formal establishment of an architecture program office. This is deemed as too expensive, without having sufficient proof of value adding. The associated responsibilities for that EA element were therefore relegated to other resources and departments already tasked with existing responsibilities.

7.2.3. Research objective 3: The challenges to the implementation and evolution of Enterprise Architecture

The third research question served to understand and identify the possible factors that influence or could potentially influence the implementation or evolution of Enterprise Architecture at organisations that participate in the private healthcare service sector.

The empirical work in conjunction with the non-empirical phase of the of the research project concluded that the challenges facing the South African private healthcare service sector, in some instances were similar to those identified in the South Africa financial services sector. It can however be said that that companies in the private healthcare services industry face their own unique set of challenges.

The investigation into these challenges was founded on factors identified by Puschmann and Alt (2004) that need to be considered when implementing EA. These are internal elements; external factors, financial considerations and software capabilities. Two additional factors are considered to broaden the view of possible challenges that may impact EA implementation. These are availability of mature EA resources and the critical success factors to be considered when implementing EA. The analysis, in chapter 6, concludes that the following stand-alone or associated themes are the most prevalent factors in challenging the implementation and evolution of EA. These are; the availability

of skilled resources and resource time; the need for system standardisation; the need for a positive ROI; the need for business understanding of EA; removal of existing legacy systems; and industry related legislation.

The availability of skilled resources and the prevailing industry legislation seem to be unique challenges facing private healthcare service companies. In contrast to international companies with mature EAs and those in the South African financial services industry, companies in the private healthcare services industry in most instances do not have their own EA resources rather relying on recruiting skilled external resources or hiring of contractors.

The poor internal availability of EA resources and resource time for EA activities can be related to an already identified internal company element, which hinders the implementation of EA, that being, a poor understanding of EA and its benefits by the decision makers within the organisation. The resultant effect is that resources are rather prioritised against day-to-day operational activities, and projects that have a guaranteed value adding (and immediately measurable) outcome for the company and ultimately its revenue streams. This element is further aggravated by the need business decision makers to have a well defined and guaranteed ROI for EA related projects. The non-empirical findings suggest, that even when the value-add of EA is understood, the ROI remains difficult to quantify. This poses a tremendous challenge for these organisations.

The need for system standardisation and removal of legacy systems, are additional themes that prevailed from the data findings, both having a negative impact on the implementation of EA. System standardisation and removal of legacy systems, although facilitated by the principles of EA are expensive long term processes requiring disciplined

and audited procedures, ensuring that companies continuously assess their systems against the capabilities and flexibility of new technologies. It is an iterative process that requires continuous investment from a financial, resource and time perspective for which the ROI is difficult to assess. Removal of legacy systems, facilitated through EA, is however beneficial by increasing agility and competitive in a dynamic industry. The process of removing legacy systems, does, unfortunately require a significant investment (initially and on-going), yet it does not yield immediate and financially visible results.

The industry is uniquely typified by declining margins aggravated by the current legislative environment, with the result that it is pressured reduce non-healthcare related costs, being administrative and IT overheads. This is contradictory for an industry with a high dependency on IT.

In summary, “*Business understanding*” and the requirement of a “*Positive ROI*” are the major challenges to the implementation and evolution of EA in the industry. The poor understanding EA, couple with resistance to invest in it, without the guarantee of a return, further aggravates, the limited availability of resources, resource time, and investment into processes to standard systems against agile technologies, which in turn would negate the prevalence of expensive and resource intensive legacy systems. Ironically the factors that resist the implementation and evolution of EA, would be addressed and made manageable through EA principles.

7.3. Recommendations to industry stakeholders.

The results of this research project should prove useful for companies in South African private healthcare services industry by enabling them to benchmark their EA maturity

levels as well understand the challenges associated with implementing and evolving EA within their respective companies.

The first recommendation would be, to implement the basics of EA, if not yet done, or at the very least implement the philosophies and strategies required to move the organisation towards an EA. Irrespective of the instrument used for the implementation, key elements of EA can be initiated or improved upon without a tremendous financial impact. It is important that a comprehensive guide to the company's EA framework is defined and documented. This would be irrespective of the framework used being formal, specialised or combination of multiple frameworks. It is imperative that the principles of its EA be understood by the Board, executive, senior and business unit managers of the organisation as well as its key stakeholders including clients and/or 3rd party business partners.

Secondly, it would be recommended to conduct an EA maturity assessment against the internal EA elements already in existence. In doing so, key EA elements which have been omitted from the implementation process or which could reduce the overall EA maturity of the organisations would be identified. In organisations where certain EA elements are deemed as too expensive or seen as not having the required ROI for execution, the associated responsibilities and functions should be formally recorded and given to a functional dept, which will take formal and penal, responsibility for its implementation. This would be done against a measureable process that will allow its implementation to be measured and tracked from improvement.

Thirdly, it would be recommended that companies develop their own EA resources as opposed to relying on sourcing EA expertise externally. Not only will this address the EA

resource concerns, but internally developed EA resources would typically understand the dynamics and processes within the business more intimately, thereby not being required to go through a learning curve before being able to add value to the organisation. In the context of developing EA resources, it would be recommended that EA becomes a direct responsibility of the company's board.

In summary, the overall recommendation would be that the company's Board, initiates a process of understand, benefits of having a mature EA, the requirements to initiate the process, and knowledge of what would be expected from an input (effort) and output (benefits) perspective.

7.4. Recommended future research

With regards to future research, additional value could be gained from further investigation into EA within the context of the South African private healthcare services sector as well as within the boarder context of other South African industries.

With regards to the private healthcare sector, as concluded, not all elements of EA frameworks against which maturity is assessed, are implemented due to their expense and perceived poor ROI. This evidently results in a skewed view regarding the maturity of already implemented and well developed components of EA within the organisation. The recommendation would therefore be:

- To conduct an in-depth assessment of EA of major companies in the private healthcare industry, ensuring that the correct EAMM protocol is followed. This would include supplementing results with documentation, and have the EAMM

results verified independently. According to Schekkerman (2006), this would assist in increasing the accuracy of EA maturity levels.

- To assess which elements of EA specifically add value to the South African private healthcare market, thereby developing an EA framework to this regard.
- Van der Klashorst (2001) indicates that the value of EA is proven without the need for a significant ROI. Schekkerman (2004) and Ross *et al.*, (2006), however indicate that although this may be true, it is of vital importance for companies and executives to assess this. The recommendation would be to conduct research in the context of the private healthcare services sector to assess whether EA does in fact yield a positive ROI for companies that implement its principles. In doing this the relationship between the costs associated with EA and its measurable benefits would be better understood by companies in the same sector, and allow for a generic ROI model for the industry.

In the context of the broader South African market, Ross, *et al.* (2006) relates to companies needing the correct strategic foundation for the implementation and maturation of EA. The recommendation would be to assess whether South African companies or sectors which are well developed and have a dependency on IT, have the correct strategic foundation for the efficient and effective implementation of EA. In the same context as mentioned previously it would be recommended to assess the impact that the level of current EA resources has on the implementation and maturation of EA, and whether it is beneficial to develop resources internally or source them externally.

7.5. Chapter conclusion

The final chapter of this research project has addressed the original research problem and its associated research objectives. It has done this through creating an understanding of the challenges faced by the industry to implement and evolve EA, in the context of the industry's EA maturity levels. It has made recommendations to the industry's stakeholders to maximise and facilitate the benefits associated with EA. Not only does this chapter propose future research recommendations in the field of EA in the context of this industry and in the context of the broader South African market, it also serves as the formal conclusion to the research project presented.

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Annexure 1: Questionnaire Pack

(this document contains the “request for interview” letter, as well as the full questionnaire)

Dear Respondent,

As per our telephonic conversation held on (insert date), I am a MBA student registered at the Gordon Institute of Business Science (“GIBS”), currently conducting research, under supervision of Dr Peter Tobin, for my dissertation on **“The Maturity of Enterprise Architecture and the challenges to its evolution in the South African Private Healthcare sector”**. I would highly appreciate your assistance with regards to this. As part of the research I will be interviewing experts in the field of Enterprise Architecture and individuals that head-up IT, at best-of-breed organisations in the private healthcare services sector, such as yourself. I understand that you have a busy schedule, but I would appreciate a time slot with you for approximately 30-45 minutes prior to 21 September, 2007. I have included the questionnaire for your perusal.

The attached questionnaire, which will be used during the interview process, is broken down in 3 sections. The first two sections are “choice selection” questions, which provide me with the required company demographics for this study, and levels of Enterprise Architecture maturity respectively. Section three contains open-ended questions that will provide your in-depth views on the challenges relating to the implementation and maturing of Enterprise Architecture within your organisation. I am comfortable that we would be able to conduct the interview within 45-60 mins. I am more than willing to accommodate meeting times before and/or after hours. I’ll call you during the course of the today tomorrow to finalise a meeting time with you if possible.

As additional information I have also attached a document summarising the motivation for this study, as well as a study conducted on Enterprise Architecture in the South African financial services sector. The information collected will be kept confidential (and anonymous) and used for research purposes only. You are welcome to contact me on 083 4588226 or valter@wol.co.za should you have any questions.

Thank you in advance for your insight and assistance.

Kind Regards,

Valter Adao

GIBS MBA class 2006/2007

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Research Questionnaire

Questionnaire for MBA Research Report



GORDON INSTITUTE
OF BUSINESS SCIENCE

University of Pretoria

The information gathered from this questionnaire will be used for analysis in a research report investigating the maturity of **Enterprise Architecture and the challenges to its evolution in the South African Private Healthcare sector**

The results of the in-depth interviews will be used for research purposes only. The responses to this questionnaire will be treated as strictly confidential.

A. Respondent information

Name of Respondent: _____

Position in Company: _____

Name of Company: _____

Location of Company: _____



Section 1.

Demographic Questions

Please select the most appropriate response for your organisation. If any questions are deemed sensitive please mark the question as N/A (not applicable).

1. What is your organisation's IT staff compliment?

- a. 3 – 20
- b. 21 – 50
- c. 51 – 100
- d. 101 - 200
- e. 201 – 500
- f. 501 – 1 000
- g. 1 001 – or more

2. What is the annual turnover of your organisation?

- a. 0 - R50 million
- b. R51- R250 million
- c. R251 million or more

3. How critical is IT to your organisation in sustaining its day to day operations?

- a. Very Important
- b. Of average importance
- c. Of average importance
- d. Not very important
- e. Not important at all

- 4. How important is Information Technology to enable growth and achievement of your organisation's strategic objectives?**
- a. Very Important
 - b. Of high importance
 - c. Of average importance
 - d. Not very important
 - e. Not important at all
- 5. Does your organisation have an IT Strategy Committee or IT council that reviews major investments on behalf of the board and executive management, and advises the Board on strategic IT decisions?**
- a. Yes
 - b. No
 - c. Don't Know
- 6. If "Yes", then does the IT strategy committee or IT council:**
- a. Involve the CIO and the most senior IT and senior business managers?**
 - a. Yes
 - b. No
 - c. Don't Know
 - b. Set priorities for IT initiatives and assigns ownership for IT enabled business opportunities?**
 - a. Yes
 - b. No
 - c. Don't Know



- 7. Is your organisation's IT strategy influenced by your board / exco's business objectives for IT alignment, and based on the organisation's strategic plan?**
- a. Yes
 - b. Partially
 - c. No
 - d. Don't know
 - e. We don't have a defined IT strategy
- 8. The strategic value of IT is understood by my organisation's board and executive management.**
- a. Fully Agree
 - b. Agree Somewhat
 - c. Do Not Agree
 - d. Don't know
- 9. All major IT investments in my organisation are taken in consultation with the Board / Exco, and are based on a risk return perspective?**
- a. Fully Agree
 - b. Agree Somewhat
 - c. Do Not Agree
 - d. Don't know
- 10. Does your IT department fully understand the business needs of your organisation?**
- a. To a large Degree



- b. To some extent
- c. Not really
- d. Not at all

11. To whom does your organisation's most senior IT Director / manager report to?

- a. CEO / MD
- b. COO
- c. FD
- d. Other general management
- e. Other – please specify

12. How good is your organisation's board / executive management at getting assurance on the performance of IT and on the mitigation of IT risks?

- a. Very Good
- b. Good
- c. Adequate
- d. Not good at all
- e. Don't know

13. Does your organisation currently make use of a formal Enterprise Architecture framework?

- a. Yes
- b. No
- c. I don't know

14. If yes, which EA model or framework is used by your organisation?

15. If your organisation has already implemented an EA framework, when was it deployed?

- a. Less than a year ago
- b. One to two years ago
- c. Three or more years ago
- d. Don't know

16. How was the EA solution implemented?

- a. Own resources
- b. External consultants
- c. A combination of these two approaches
- d. Don't know

17. How difficult / easy was the implementation of EA?

- a. Difficult
- b. Moderately difficult
- c. Easy
- d. Don't know

Section 2

Questions relating to the Enterprise Maturity Model

The following questionnaire is to be presented in the form of a structured interview. The question or statement in the left column is to be read to the respondent. The 6 choices are to be read out to the respondent. They are to select one choice, which will be recorded in the row that is marked “select choice”.

Question / Statement	Level 0: No Extended Enterprise Architecture	Level 1: Initial	Level 2: Under Development	Level 3: Defined	Level 4: Managed	Level 5: Optimised
Describe the Business & Technology Strategy Alignment	No awareness of alignment of business strategies, business drivers, principles with IT strategies, drivers & principles.	Initial alignment of business strategies, business drivers & principles with IT strategies, drivers & principles.	First activities visible to align business strategies, drivers & principles with IT strategies, drivers & principles.	Formal alignment of business strategy, drivers, principles & functional / non-functional requirements with IT strategies, drivers, principles and functional / non-functional requirements.	Frequent reconsideration of business strategy, drivers, principles & functional / non-functional requirements with IT strategies, drivers, principles and functional / non-functional requirements.	Business –Technology cost / benefits. Validation metrics for end-to-end value chain examination.
Select Choice						



Describe the Extended Enterprise Involvement	No involvement of extended parties. No collaboration agreements.	Incidental involvement of extended parties.	Awareness of collaboration with extended parties. First initiatives to involve extended parties in the EA program.	Extended parties involved in the EA program. Definition of collaboration levels and information exchange standards.	EA management & governance structure in place.	Measurement structure in place to manage the EA environment.
Select Choice						
Describe the Executive-Management Involvement	EA is not a focus. We do not need to be involved. We know how to do our job. Don't tell me about EA	What is EA about? I have heard something about EA	Little awareness by management of EA possibilities. Spread scepticism to adopt EA.	Executive management aware of EA benefits. Executive management supports pro-active EA program.	Executive management evaluates periodic the EA program and results.	Executive management participating in the EA optimisation process.
Select Choice						
Describe the Business Units Involvement	EA is not recognised by any business unit.	Some business units support the EA program and will deliver some added value to the Business – IT alignment process.	Identification that it is hard to maintain too many different business processes and supporting technologies in a dynamic business world.	Identification that an EA program can reduce complexity and can enhance business flexibility. Adaptive Business – IT alignment is the answer to business dynamics.	Enterprise wide business units are actively involved in the EA program.	EA is established in all business units and is part of their decision making process.
Select Choice						



Describe the Extended Enterprise Architecture Program Office	EA program does not exist.	First cut of EA program in place. EA architects identified.	EA program being actively defined. EA program office established.	EA program established. EA program office actively working together with business and IT units in defining EA value.	EA program office is involved in the line of business and the enterprise budget process.	Continuous measurement of EA program activities and results.
Select Choice						
Describe the Extended Enterprise Architecture Developments	No EA recognition.	Some EA activities are started. Recognition about focusing on business value & IT standards & cost reduction activities. <i>Ad hoc</i> alignment of Business and IT.	EA program is set up. Business and IT strategy and standards are developed and linked. EA framework and methodology are chosen but not yet widely spread.	EA program established. Business & IT principles, drivers and strategies are defined and communicated. EA and solution architecture areas are defined and aligned.	EA program managed by EA steering committee. Reference models are rolled out and accepted by business units. EA program office involved in the definition of new projects. EA reflects current and future state.	EA program office manages projects portfolio landscape and continuously aligns the overall activities and initiatives.
Select Choice						
Describe the Extended Enterprise Architecture Results	None.	EA results are documented in a single way. No access to the results for others.	EA results are shared with others. Most results are documented using traditional office tools. Access to the results is limited. Sharing of information in a traditional way. Modeling and visualisation techniques are developed.	EA results are Updated frequently. Standards, modeling methods and visualization techniques are used. An EA repository is set-up.	EA results are controlled and managed regularly. Business units are using the EA results in their business planning. EA results are accessible in an electronic way for all participants.	EA results are mandatory & used in the enterprise wide strategic planning and Governance activities. Continuous improvement of strategic planning and decision making cycle based on EA results.
Select Choice						



<p>Describe the Strategic Governance</p>	<p>Strategic governance in not in place.</p>	<p>Strategic Governance is in place and the first activities are set up to link the EA program and strategic governance.</p>	<p>EA results are part of the strategic governance process. The enterprise program management office and the EA office are working together on an incident base.</p>	<p>Strategic decision making and governance are based on the EA output. The EA program office is involved in the formal governance processes.</p>	<p>Formalised strategic governance of all business & IT investments based on EA output.</p>	<p>Value measurement techniques are adopted to continuously measure the business and IT value of investments based on the EA results and in line with the governance strategy..</p>
<p>Select Choice</p>						
<p>Describe the Enterprise Program Management</p>	<p>Enterprise program management not recognised.</p>	<p>Project management upgraded to program management. Recognition of the added value of enterprise program management. Program management executed almost in isolation.</p>	<p>Enterprise program management and EA linked together. Enterprise program management office responsible for the transformation part, EA office is responsible for the content.</p>	<p>Enterprise program management office and EA office, officially working together. Program management approach and EA program aligned. Accountability and responsibility of activities are defined.</p>	<p>Project and program initiatives under auspices of the enterprise program management office with participation of the EA office. Procedures, standards and methods are aligned.</p>	<p>Enterprise program management office and EA office are participating in the enterprise strategic planning process. Measurement techniques are in place to determine the added value to the business of all initiatives.</p>
<p>Select Choice</p>						



<p>Describe the Holistic Extended Enterprise Architecture</p>	<p>Awareness of aligning business and technology not present.</p>	<p>Awareness of aligning business and technology present. First initiatives set up to align business and technology activities, based on the enterprise, its mission, vision strategies and business drivers.</p>	<p>Activities are set up to continuously align business and technology initiatives. Alignment of business and information modelling methods with the technology modelling methods.</p>	<p>EA framework is used to define the business IT alignment areas. Results of business and IT modelling methods are stored in a repository. Traceability of business and IT alignment exists.</p>	<p>Every project or program initiative is measured against the added value to the business and the cost of investments. The current and future state EA are used as a management tool to plan transformation initiatives. Business and Technology are operating on the same level of maturity.</p>	<p>The holistic EA approach is part of the organisation's culture. Business initiatives are continuously reflected to the technology impact and IT possibilities are driving new business activities.</p>
<p>Select Choice</p>						
<p>Describe the Enterprise Budget & Procurement Strategy</p>	<p>Separated Business & IT budget Procurement strategy</p>	<p>Almost no awareness about aligning and managing the enterprise business & IT budget and procurement strategies.</p>	<p>First awareness about the alignment and management of the enterprise business & IT budget and procurement processes.</p>	<p>The EA office is participating in the enterprise budget and procurement strategy. Request for information or proposals are defined in cooperation with the EA office.</p>	<p>The future state EA acts as a blueprint for investments, and is formalised and part of the enterprise budget process.</p>	<p>All investment plans and initiatives are related to the EA results, the budgets and procurement strategy.</p>
<p>Select Choice</p>						

Section 3

Questions relating to the Challenges to the implementation or Evolution of Enterprise Architecture

1. Please describe the level of Enterprise Architecture within your organisation? (this question is to be asked without revealing the results of the Maturity Model questionnaire)

2. What are the internal company elements that influence or could potentially influence the implementation or evolution of EA within your organisation? Please discuss matters in the order of prevalence. Please elaborate on your answers.

3. What is the availability of the mature EA resources to your organisation? Does this impact your ability to implement or evolve EA within your organisation?

4. What are the software capabilities within the organisation that influence or could potentially influence the implementation or evolution of EA? Please discuss matters in the order of prevalence. Please elaborate on your answers.



5. What are the external factors that influence or could potentially influence the implementation or evolution of EA within your organisation? Please discuss matters in the order of prevalence. Please elaborate on your answers.

6. What are the financial considerations that need to be considered the implementation or evolution of EA within your organisation? Please discuss matters in the order of prevalence. Please elaborate on your answers.

7. What other critical success factors to achieve the implementation or evolution of EA within your organisation? Please discuss matters in the order of prevalence. Please elaborate on your answers.

8. Optional (at the discretion of the interviewer). Should your organisation not have implemented EA yet: do you see value in initiating the EA implementation process? If not, do you believe that it is of vital importance to companies that participate in the South African Private Healthcare services value chain?



9. What other factor's not mentioned could impact the implementation or evolution of EA within your organisation? Please discuss matters in the order of prevalence. Please elaborate on your answers.
