

الجامعة  
البريطانية في  
دبي



The  
British University  
*in Dubai*

# **A study on Enterprise Architecture framework effects on business processes automation**

**By**

**Salama AlDhaheer**

Dissertation submitted in partial fulfillment of  
MSc Information Technology Management

Faculty of Engineering & IT

Dissertation Supervisor

Dr.Khaled Shaalan

May-2011

## **Abstract**

Enterprise Architecture (EA) concept is used usually within the Information Technology (IT) area, it supports designing and planning of multiple architectural layers, starting from technology architecture, going through application architecture and information architecture and ending at the business architecture. Where EA framework, organizes, describes and presents all the information contains within the EA to support decision-making. Currently there is new approach for delivering the business using business services, which demands great understanding to the organization processes and the supporting technology for these processes. Many organizations encounter issues with documenting their business processes and the IT architecture because of the fast growing and complex environment. Adopting EA framework can empower the IT governance to facilitate solutions that supports understanding the different layers in the organization and identify the business services for automation. The aim of this research is to provide insight to the business processes automation projects and the attached risks, EA framework was discussed as a solution to mitigate or avoid that risk. The research study was conducted within UAE government organizations; this shall include the local, federal and semi government organizations. Based on the proposed methodology to collect the data, a survey, literature review and interviews were carried to study the possible effect of EA on business processes automation. The observations recommended EA as a strong supporter to the identified success factors in business processes automation initiatives, EA could be adopted and implemented by the IT or the business, however the observations showed that EA implementations requires power and authority for the change management process.

**Key words:** Enterprise Architecture, Enterprise System, Chief Information Officer (CIO), Information Technology (IT) Management, Business Process Automation (BPA).

## **Acknowledgements**

This dissertation is the last part of my master in IT management at the British university in dubai. During my academic life I studied different modules in IT and business, so, I decided to write my dissertation in Enterprise Architecture, EA is an important part in the IT and business relationship. I couldn't finish my writing without the help of many people around me. I would like to thank my mother, father and, my great aunt for their encouragement and prayers. Thanks to my supervisor Dr.Khalid Shaalan for his patience in advising me, also for his efforts and follow up helping me to deliver my dissertation. Aysha and Fatma, thank you for your positive encouragements as friends. I appreciate all the time and support from my colleagues at work.

Thanks to The Emirates Foundation and The British University in Dubai (BUiD) for the scholarship and their support during my study. I am confident that I will add a value to the community with my research; I enjoyed doing this research because it relates to my job and will be of a great support.

## List of abbreviations

CIO: Chief Information Officer
DoDAF: Department of Defense Architecture Framework
EA: Enterprise Architecture
FEAF: Federal Enterprise Architecture Framework
IT: Information Technology
KPI: Key Performance Indicator
SOA: Services Oriented Architecture
SaaS: Software as a Service
TOGAF: The Open Group Architecture Framework

## List of illustrations

Figure 1: Architectural representations (creative homeowner 2004 in Jacobs 2008, p40)	12
Figure 2: The EA elements (Knippel 2005, p15)	13
Figure 3: EA context (Jacobs 2008, p38)	14
Figure 4: Architecture Governance Framework - Organizational structure (The Open Group 2006, p9)	15
Figure 5: Typical enterprise architecture reporting structure (Feurer 2007, p9)	16
Figure 6: Typical entry points (Jensen, Cline & Owen 2011, p22)	17
Figure 7: Bi chart for the used Enterprise frameworks in 2005 (IFEAD 2005, p28)	20
Figure 8: Bar chart for the used Enterprise frameworks in 2005 (IFEAD 2005, p28)	20
Figure 9: The EA tools (IFEAD 2005, p29)	21
Figure 10: TOGAF ADM phase model (Jensen, Cline & Owen 2011, p95)	24
Figure 11 : Segments and services (Enterprise Architecture) (OMB 2007, p3)	26
Figure 12: Projects success factors (CHAOS 2009, p3)	30
Figure 13: Project resolution (CHAOS 2009, p1)	30
Figure 14: Empirical cycle (Manor college 2006, p1)	35
Figure 15: Evaluating information systems (Gammelgard, Ekstedt & Narman 2010, p3)	61
Figure 16: Service component reference model (OMB 2005, p19)	62
Figure 17: Extended influence diagrams (EID) (Raderius, Narman & Ekstedt 2009, p3)	63

Figure 18: Results assessment (Raderius, Narman & Ekstedt 2009, p10) .....	63
Figure 19: Strategy and technology creates a gap between business and the IT (Celik 2009, p2).....	64
Figure 20: Objective of EA (Celik 2009, p2) .....	64
Figure 21: Scania IT area R&D's concept for EA (Celik 2009,p4) .....	65
Figure 22: IT projects phases (Celik 2009, p26) .....	65
Figure 23: Celik (2009) .....	67
Figure 24-A: Application decisions (Franke and Johnson 2009, p2) .....	68
Figure 24-B: Decisions and the calculation of the related utilities (Franke and Johnson 2009, p3).....	68
Figure 25: MODAF architecture (Franke & Johnson 2009, p6) .....	69
Figure 26: Meta model (Franke & Johnson 2009, p8) .....	70
Figure 27: Bayesian network tool GeNIe to illustrate the use of the method for scenario-based decision making (Franke & Johnson 2009, p9).....	71
Figure 28: Conceptual view of an IT/Business alignment operationalization.....	72
(Saat et al. 2010, p4).....	72
Figure 29: The core meta-model (Saat et al. 2010, p7) .....	74
Figure 30: Meta model fragment for as-is situation A on its prioritized qualities .....	75
(Saat et al. 2010, p7).....	75

## List of tables

Table 1: Zachman framework for enterprise architecture (Saenz 2005, p51) .....	22
Table 2: Description of TOGAF ADM phases (Josey et al. 2009) .....	25
Table 3: SOA issues (Knippel 2005, p20).....	32
Table 4: SOA and EA relation (Knippel 2005, p20) .....	33
Table 5: Advantages of face-to-face interviews (Niemann 2005, p193).....	39
Table 6: Disadvantages of face-to-face interviews (Niemann 2005, p193) .....	39
Table 7: Interview analyses report organization A and B .....	58
Table 8: Interview analyses report organization C and D .....	60
Table 9: Four clusters prioritized the following qualities high or very high in their to-be situations (Saat et al. 2010, p10).....	73

## Table of content

<b>1. Introduction .....</b>	<b>8</b>
1.1. Statement of the problem.....	8
1.2. Research aim and objectives.....	9
1.3. The research questions .....	9
1.4. Research approach.....	10
1.5. The organization of the dissertation .....	10
<b>2. Literature review .....</b>	<b>11</b>
2.1. What is Enterprise architecture .....	11
2.2. Role of enterprise architecture team .....	14
2.3. Benefits of enterprise architecture .....	16
2.4. Enterprise architecture frameworks.....	19
2.4.1. Zachman Framework.....	21
2.4.2. Open Group Architectural Framework (TOGAF).....	23
2.4.3. Federal Enterprise Architecture Framework (FEAF).....	26
2.5. Business Process Automation (BPA).....	27
2.6. Rational behind enterprise architecture implementation with business process automation .....	28
2.7. Business process automation matters.....	29
2.8. Summary.....	33
<b>3. Methodology.....</b>	<b>34</b>
3.1. Research methodology design .....	34
3.2. Empirical research.....	35
3.3. Hypothesis and research question .....	36
3.4. Limitations of empirical research.....	37
3.5. Data collection .....	37
3.6. Instrumentation.....	38
3.6.1. Interviews method.....	38
3.6.2. Interview design.....	39
3.6.3. Survey method .....	42
3.6.4. Survey Design .....	42
3.7. Research validity and reliability.....	49

3.8. Methodology procedure.....	49
3.9. Research methodology limitations.....	49
3.10. Summary .....	50
<b>4. Findings and discussion.....</b>	<b>51</b>
4.1. Survey results .....	51
4.2. Interview results .....	55
4.3. EA strengths in supporting BPA projects .....	60
4.3.1. <i>Evaluating different information systems using EA.....</i>	<i>60</i>
4.3.2. <i>Calculating service quality of existing information system using EA.....</i>	<i>62</i>
4.3.3. <i>Managing IT portfolio using EA.....</i>	<i>64</i>
4.3.4. <i>Application consolidation using EA.....</i>	<i>67</i>
4.3.5. <i>IT strategy alignment with business strategy using EA .....</i>	<i>71</i>
4.4. Answering the research questions .....	75
4.5. Summary: .....	79
<b>5. Conclusion and recommendations .....</b>	<b>80</b>
5.1. Conclusion.....	80
5.2. Limitations .....	80
5.3. Recommendations and further work .....	80
<b>6. Appendix A: Survey questions .....</b>	<b>82</b>
<b>7. Appendix B: Survey data analysis report.....</b>	<b>89</b>
<b>8. References.....</b>	<b>117</b>

# **1. Introduction**

This chapter will introduce the research study. The first section will discuss the problem area of enterprise architecture and its necessity to business processes automation projects. The second section will define the research aim and objectives. Research questions will be presented in the third section and the methodology to answer the research questions will be covered in the fourth section of this chapter. The last section intends to describe the structure of the thesis.

## **1.1. Statement of the problem**

In the last decade, the IT field was focusing on two main problems, which are, the complexity of IT systems and, the difficulty to align the IT systems to the business needs (Sessions 2007). Today, the same concern is still on the CIO's agenda, but the fact that government demands to reduce the spending, have accelerated the need for less complex IT environments that can be managed and linked to the business strategy. However, some organizations are seeking efficiency into their business processes, which could require investment in the process re-engineering initiatives and integration between the IT systems. Currently, the trend is how to transform the IT to a real value to organization's business.

The concept of enterprise architecture was introduced in the past 20 years, as a support to the decision-making process, such as, adopting new technology, changes to the information system and documenting IT architectures. As a result many theories and studies were built based on the enterprise architecture frameworks. One main value for the enterprise architecture is it acts as a common language between the IT and the business, and can save time and effort when mapping the technology to the organization strategy and processes.

This research argument is about, how essential it is, to have enterprise architecture framework in the process of implementing an automation initiative. Adopting an enterprise architecture framework might add value to the automation initiative, in terms of selecting the right technology and processes.



## **1.2. Research aim and objectives**

This research aims to examine the necessity of implementing enterprise architecture framework for the organizations, as a baseline to achieve their business strategy. The research study intended to cover UAE government organizations. The objectives which has been set to achieve the aim are:

- Identify the attached risk with the processes automation initiatives
- Presents the success factors for automation initiatives
- Explore the strength of the enterprise architecture framework

## **1.3. The research questions**

Based on the aim and objectives listed in the previous section. The main question for the research is: How dose implementing enterprise architecture framework affects the business processes automation initiatives?

In order to answer the above question, there are sub-questions has to be answered first. I divided the questions into two parts. The aim of part one questions is to learn if there are issues with the automation initiatives, a survey and literature review will be used to answer these questions. Where as in part two, the aim is to explore the preparation that was taken to implement the automation initiatives, part two requires detailed information; therefore it will be answered using face-to-face interviews. Below are the questions of part one and two:

Part one:

RQ1-A: What are the issues and risks encountered during the implementation of business process automation projects?

RQ1-B: What is the root causes for the issues collected from RQ1-A?

RQ1-C: What success factors can be obtained based on the result of RQ1-B?

Part two:

RQ2-A: How dose the technology solution for automation is selected?

RQ2-B: How dose the processes to be automated are selected?

RQ2-C: Are there any hindering reasons for not implementing enterprise architecture framework?

By answering the questions in part one and two, the answers can be analyzed and mapped to the capabilities of the enterprise architecture, which will facilitate the answer for the main question of this research.

#### **1.4. Research approach**

In order to answer the research question and sub-questions identified in the previous section, a research approach was designed. The first phase in the approach is to review the existing related work and find initial information about business processes automation issues and concerns, the collected information will be included in a survey to test the validity of this information in UAE government organizations. In parallel another procedure will be triggered to gather detailed information about existing business processes automation, face-to-face interviews for this procedure will be used.

After collecting the required data, literature review will be initiated to find EA related work, which focus on the issues, and concerns that were gathered by the first and second phases. Final discussion about the findings will be conducted to locate any correlation between implementing EA and successful business processes automation initiatives.

#### **1.5. The organization of the dissertation**

After this section, the dissertation will be structured as follows:

Chapter 2 will review the related literature review in the research topic; it will discuss the Enterprise Architecture (EA) concept and the benefits from implementing EA to IT and business strategy. Further more it will present the concept of Business Process Automation (BPA) and the motivation behind BPA implementations. The relation between EA and BPA will be introduced as well.

Chapter 3 will discuss the adopted methodology to answer this research question. The design of the used instrumentations is included with justifications.

Chapter 4 will review the findings and the data analysis.

Chapter 5 is about the final recommendations and conclusion of this research. Also it will have the research limitations and further work.

## **2. Literature review**

### **2.1. What is Enterprise architecture**

Enterprise architecture has become a more popular term that has been introduced recently with the SOA. Enterprise architecture differs from the SOA in a way that it deals with data processing. Koch (2007, p20) stated, “Enterprise architecture role is to deliver the information and analysis that helps organizations understand how to leverage the value of proposition of SOA.”

Across many references, there were multiple descriptions and definitions related to the enterprise architecture, but going into the planned objectives for each enterprise architecture initiative, the reader can understand better the concept and the characteristics of that particular enterprise architecture.

In general, enterprise architecture is commonly viewed as a discipline that merges strategic business and IT objectives with opportunities for change and governs the resulting change initiatives (Jensen, Cline & Owen 2011). It drives the organization portfolio in a strategic context by directing the change toward common enterprise goals.

Stevenson (1995 in Jacobs 2008) defined the EA as an integrator between:

- Business planning parts such as goals, visions, strategies and governance principles
- Business operations parts such as business terms, organization structures, business processes and data
- Application systems and databases
- Computers, operating systems and networks of the technology infrastructure.

Another engineering definition stated by Jacobs (2008, p39) that simulate the EA as drawings for a building “The first principle is that there is a set of architectural representations produced over the process of building a complex engineering product representing the different perspectives of the different participants”.

In figure 1, the frontal sheet and the floor plan represent the perspective of the homeowner whereas the foundation plan and the roof plan are of greater importance for the builder (Jacobs 2008):

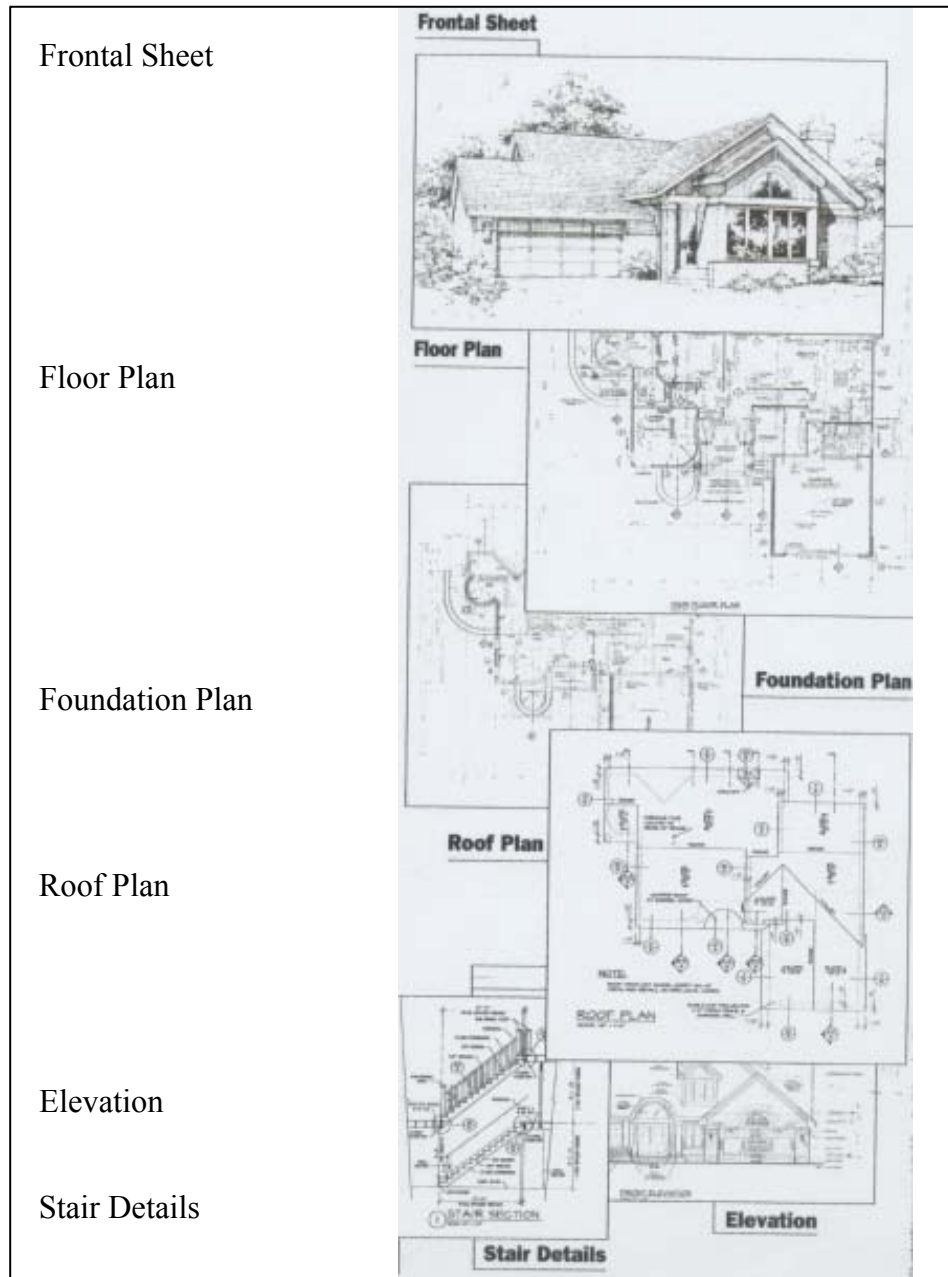


Figure 1: Architectural representations (creative homeowner 2004 in Jacobs 2008, p40)

Enterprise architecture can be seen as a blueprint for the organization's operation with a description of how these operations are being maintained by the IT infrastructure (Congressional research services 2008). Among many organizations, enterprise architecture can be misunderstood as a solution or a system, where it is more about

understanding the organization's design from top to bottom in order to assist the decision makers in making the right approach in the right time with the right tool.

As described by Johnson et al. (2007 in Raadt 2011), enterprise architecture provides a means for choosing from a selection of solution alternatives, the optimal solution, to a complex organizational problem.

The below figures 2 and 3, are showing the main elements and context of enterprise architecture, but the framework of EA described by MITRE (2004 in Knippel 2005, p16) as “A logical structure for classifying and organizing complex information, an enterprise architecture framework provides an organizing structure for the information contained in and describing an EA”.

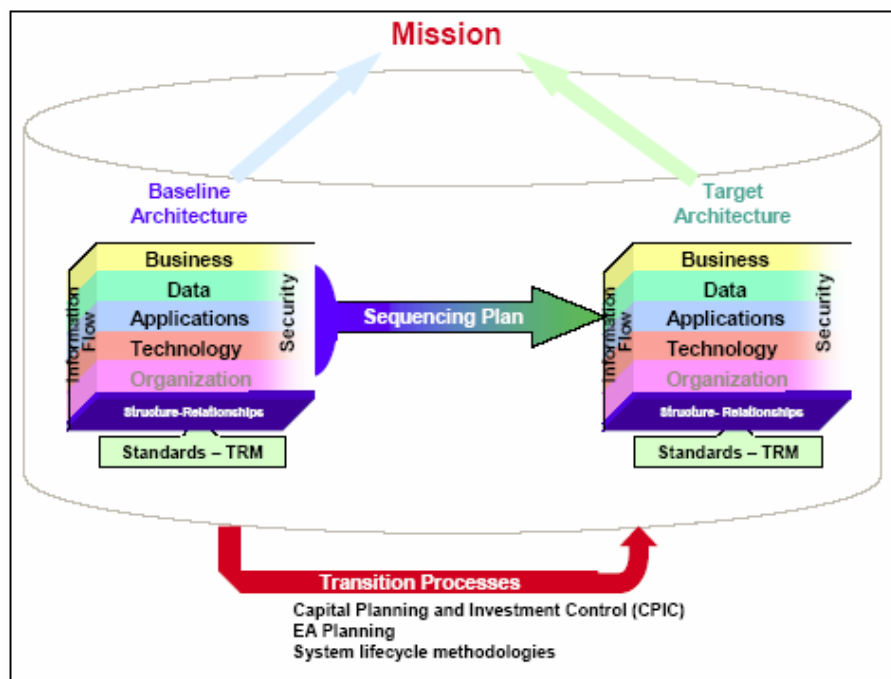


Figure 2: The EA elements (Knippel 2005, p15)

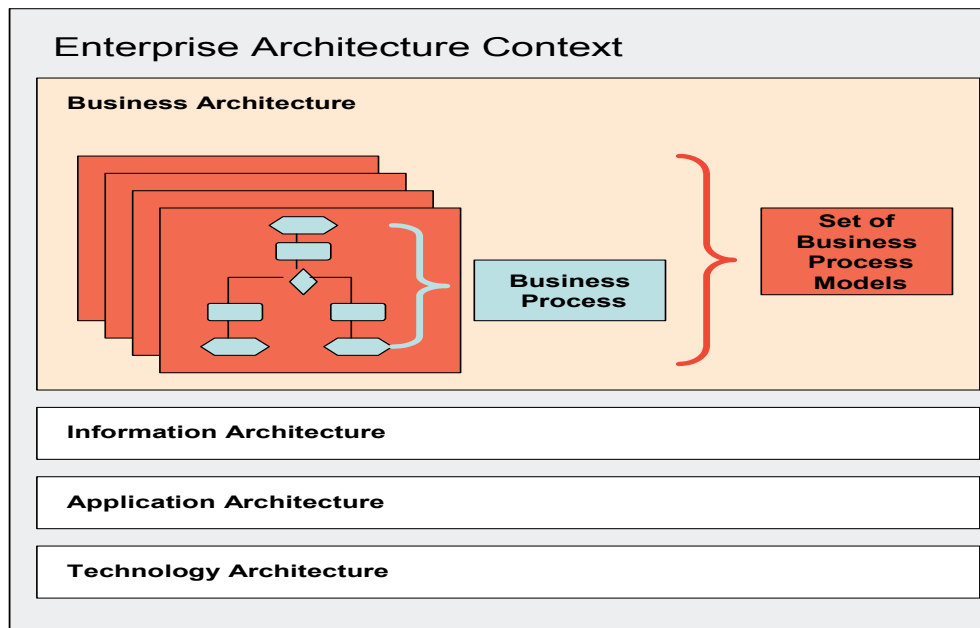


Figure 3: EA context (Jacobs 2008, p38)

The information system architecture can be of a similar objective of the enterprise architecture, but as explained by Jahani, Javadein and Jafari (2010, p177) " The difference between enterprise and information systems architecture is that enterprise architecture considers all aspects of organization such as users, systems, geographical location, mode of dispersion, working processes, work motivation, problem solving processes, etc., whereas data architecture is only focused on data".

## 2.2. Role of enterprise architecture team

Tutorgig (2010, p5) describes the role of enterprise architect as "A person responsible for developing the enterprise architecture and is often called upon to draw conclusions from it". Another definition for the architect role is that, his responsibility is the design of architecture and the creation of an architectural description (Sessions 2007).

At some organizations the enterprise architecture office can be found under the CIO, as part of the IT governance, where other organizations place the architecture office under the higher business management. In TOGAF, one of the enterprise architecture frameworks, the governance organizational structure is presented as in figure 4 below:

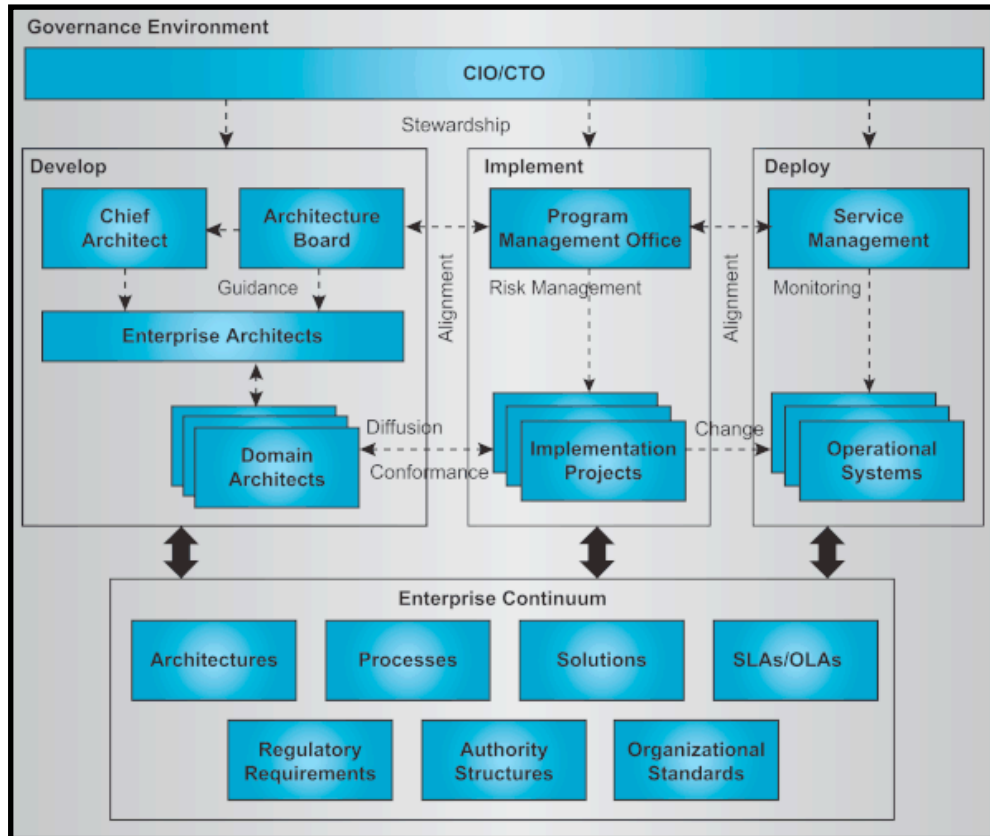


Figure 4: Architecture Governance Framework - Organizational structure (The Open Group 2006, p9)

In Feurer (2007) research, he pushes the idea of having the enterprise architecture to be embedded in under the CIO and to link the enterprise architecture activities to the IT strategy planning. Figure 5 illustrates a common model of enterprise architecture team under the CIO; the team has four main roles (Feurer 2007):

- Business architect: Usually works with the business specialists to develop rational model for business through the organization strategy.
- Technical architect: A person who is specialized in one or more technical domain to advice in the infrastructure requirement to perform the business processes.
- Solution architect: Design required enterprise solutions by combining architectural artifacts of the business, technology and information viewpoints.

- Information architect: Deal with the basic topic concerning information accuracy and timing, as well as authentication and security. In order to provide the right information for decision-making process.

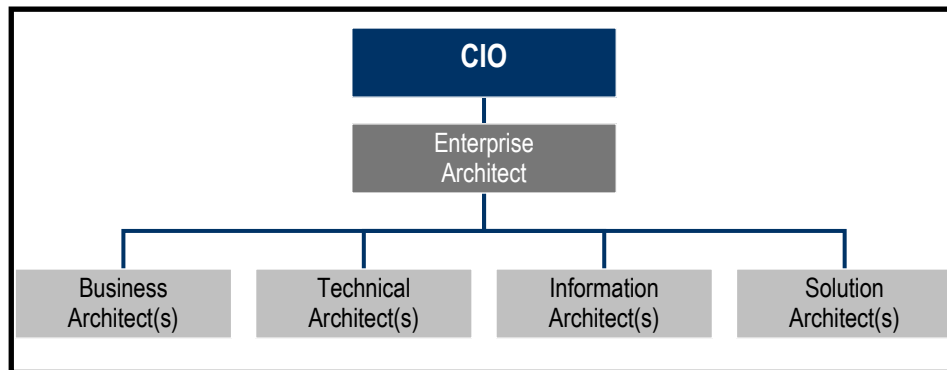


Figure 5: Typical enterprise architecture reporting structure (Feurer 2007, p9)

The establishment of the correct organizational responsibilities and structures to support the architecture governance processes and reporting requirements framework is considered by TOGAF as a success factor for the enterprise architecture implementation (The Open Group 2006).

Despite the hierarchal structure of the enterprise architecture inside the organization, it is important to consider the success factors while managing the enterprise architecture initiative to return the value of the investment.

### **2.3. Benefits of enterprise architecture**

In the previous sections, an introduction to enterprise architecture definition was presented. This section will highlight the added value and benefits of the enterprise architecture.

There are some identified areas where enterprise architecture could be used to solve business problems or a challenge; the figure below is illustrating most of these entry points (Jensen, Cline & Owen 2011).





Figure 6: Typical entry points (Jensen, Cline & Owen 2011, p22)

- Business efficiency: allows organizations in achieving a particular business goal or driving costs out of the operations of the organization
- IT planning and Optimization: IT planning is key to ensure that the IT environment is lean, responds to business needs, and is perceived as an enabler for the organization
- Enterprise Resource Planning (ERP): it affects the way that many of the business processes operate within an organization
- As organizations look at a wider enterprise vision of their organization, they typically describe systems of systems vision. This vision includes suppliers, partners, and other channels in the enterprise ecosystem, which need to be understood as a whole.
- Service architecture: business services need to be service-aware and provisioned on the cloud or as part of Software as a Service (SaaS) offering.
- Governance, risk and compliance looks at the typical issues that an organization faces in terms of market compliance, risk, auditing and tracking, and overall governance. Although many organizations try to track these often-mandatory business controls with individual programs and initiatives, enterprise architecture can provide additional valuable insight.

To elaborate more, Mooney (2009) presented the enterprise architecture as a method to analyze the organization infrastructure, mainly to optimize the IT spending, as an effective way to cut the cost. Mooney (2009) identified three values for the enterprise architecture, which can help the organizations in the recession:

1- Identify duplicates or under-utilized overhead

In enterprise organizations, with growing demands from the customers or internally, the IT systems can be extremely complex to control, it is not surprising to see some redundancy in the applications that could be integrated or consolidated for better utilization and cost saving.

2- Optimize the value chain

For any enterprise service provider, the customer satisfaction is one of the Key Performance Indicators (KPIs) in its strategic plan. Without understanding the relationship between the different processes inside the organization, it can be hard to identify opportunities for efficient performance.

3- Quickly and effectively assimilates mergers and acquisitions

Another key aspect and a value for the enterprise architecture, its capability to anticipate the change in the organization design, which will support the management in making better decision and evaluate any opportunities for merging and acquisitions.

In further reference to this, Jensen, Cline and Owen (2011) argue that enterprise architecture could empower the organization to make specific decisions, about which future states to implement based on cost, resource, and architectural fit. It will also impact architectural direction of projects, new applications and technology, based on business need and value.

By exploring in different areas of problems in which enterprise architecture could resolve, the below is a summary of the main exhortations for enterprise architecture implementations:

- Justify the IT spending
- Demands for more information and evaluation criteria by the decision makers
- Share information
- Plan for services to be on cloud computing

- Outsource IT services
- Support business change management
- Maximize the benefit from the relationship of enterprise architecture and Knowledge Management (KM).

Enterprise architecture can develop compatibility and a harmony among operational, information and communications technology layers of an organization and creating a common organizational language (Jahani, Javadein & Jafari 2010), generally this could be the most beneficial outcome of enterprise architecture to any organization.

## **2.4. Enterprise architecture frameworks**

As mentioned in section 1.2, the EA framework is responsible for describing the organization EA. The Zachman is known as the father of the enterprise architecture framework as he was the first to introduce the vision of enterprise architecture framework. In 1987 he originated the Zachman Framework as a standard for classifying the descriptive representations (models) that comprise enterprise architecture.

EA framework as outlined by Jensen, Cline and Owen (2011, p20) “Enterprise Architecture frameworks usually provide a context in which all stakeholders in an organization can communicate and collaborate about their enterprise architecture”. The framework for enterprise architecture defines how to organize the structure and views associated with enterprise architecture (Wikipedia 2011).

Many enterprise architecture frameworks have been introduced in the past 20 years; Sessions (2007) believes that 90 percent of the field use one of these four methodologies:

- The Zachman Framework for Enterprise Architectures
- The Open Group Architectural Framework (TOGAF)
- The Federal Enterprise Architecture Framework (FEAF)
- The Gartner Methodology

Sessions (2007) is arguing about the non-completion of any framework mentioned above, and he advice to use a blind methodology based on the organization needs.

Sessions (2007) added in his research that any of these frameworks can complete the other, although they have so little in common, the architect can build the suitable framework that can easily be supported and succeed for the organization culture.

In another study conducted by IFEAD (2005) over three years, the first four frameworks were blended (organization own), Zachman, TOGAF and DoD architecture.

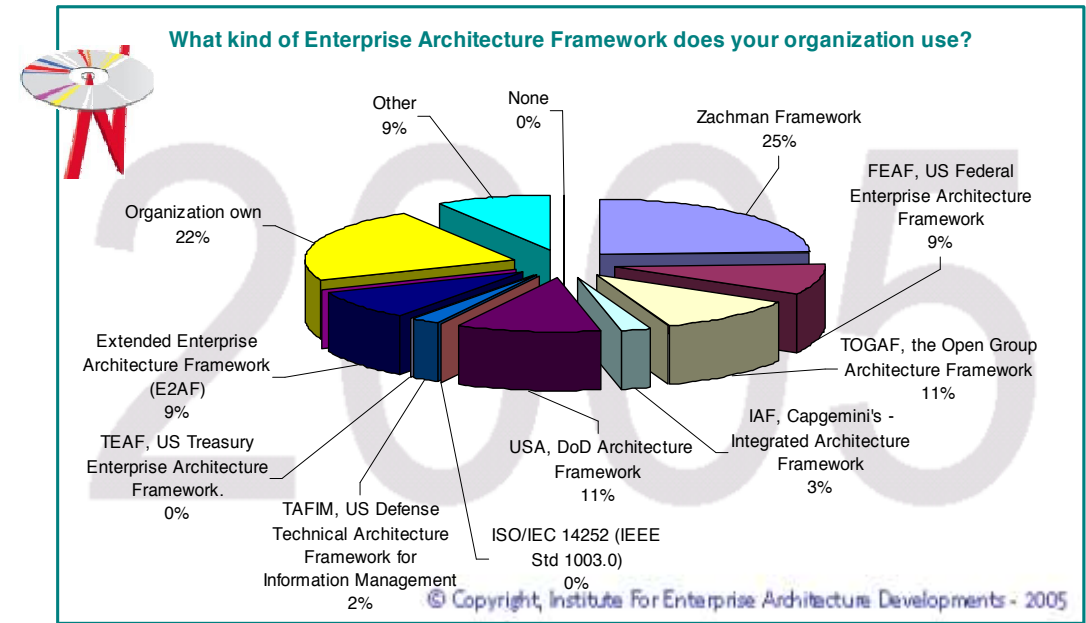


Figure 7: Bi chart for the used Enterprise frameworks in 2005 (IFEAD 2005, p28)

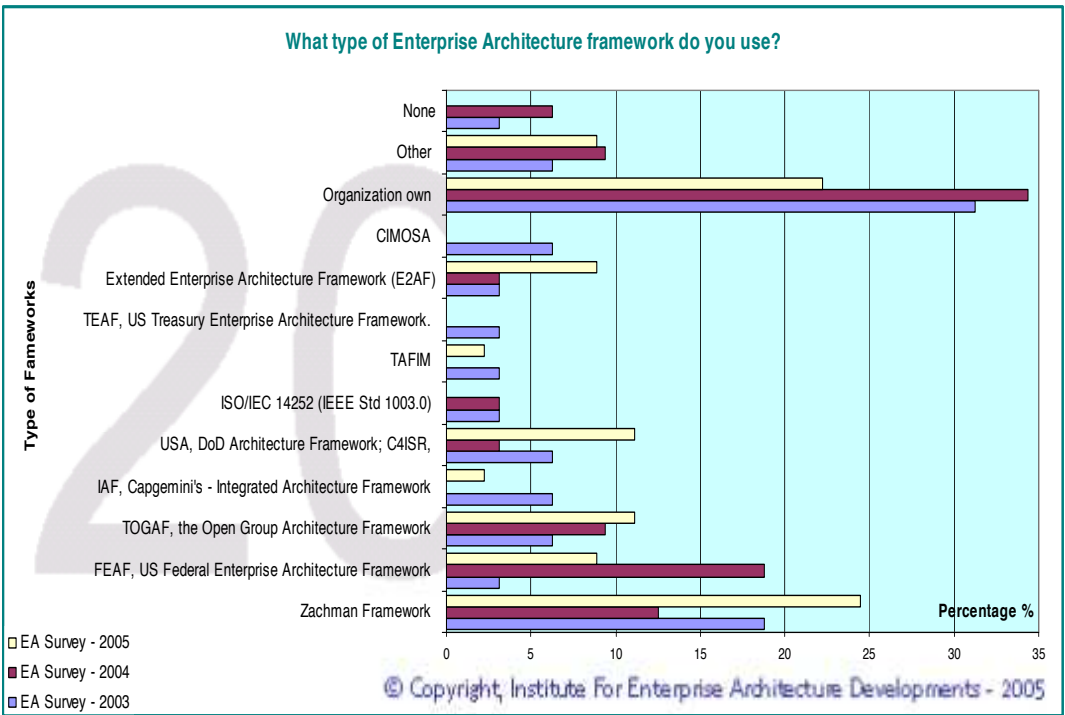


Figure 8: Bar chart for the used Enterprise frameworks in 2005 (IFEAD 2005, p28)

It worth mentioning some tools that are used to model the enterprise architecture objects, (figure 9) below is a diagram showing some of the popular tools in this area:

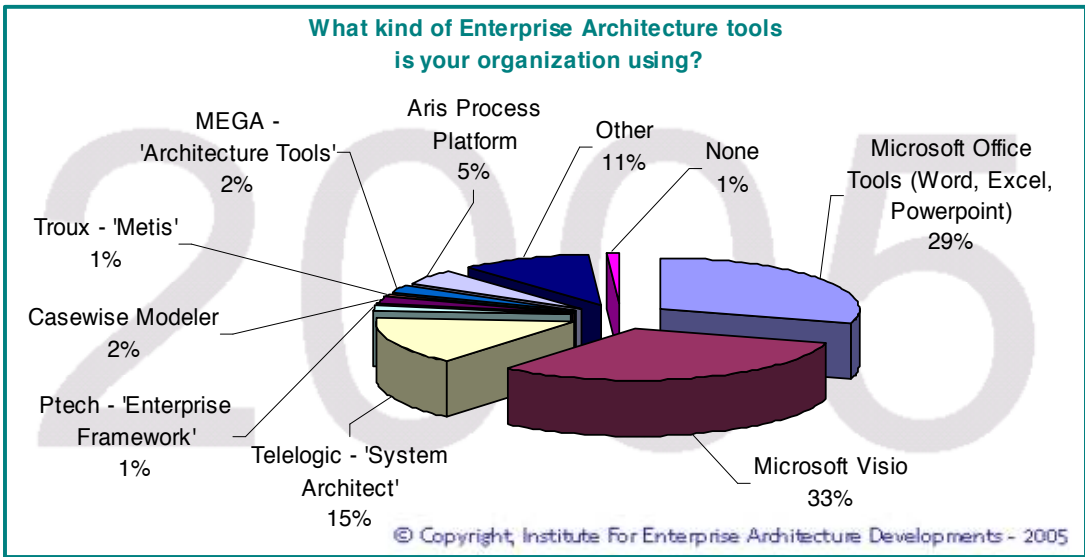


Figure 9: The EA tools (IFEAD 2005, p29)

The focus in this research is to introduce the value of the enterprise architecture instead of recommending specific framework to be implemented. I have selected three EA frameworks to describe the concept of enterprise architecture, TOGAF and Zachman because it is among the top used frameworks, and FEAF because it focuses more on the government entities.

#### 2.4.1. Zachman Framework

As mentioned earlier in this section, Zachman framework was first introduced in 1987, the Zachman Framework for enterprise architecture classifies enterprise models by two basic aspects: the intended audience and the content of the model (Saenz 2005). Table 1 below is showing the five intended audiences and the six contents description that forms the Zachman framework.

PERSPECTIVE / INTENDED AUDIENCE	MODEL (CONTENT)					
	Data (What)	Function (How)	Network (Where)	People (Who)	Time (When)	Motivation (Why)
Scope (contextual) / Planner	Things important to the business	Processes performed	Location to operate	Major organization units)	Events/ cycles	Goals/ strategies
Business model (conceptual) / Owner	Semantic model (business entity & relationships)	Business process model; input/output resources	Business logistic system (location- linkage)	Workflow model (organization unit - work product)	Master schedule (event-cycle)	Business plan (objective- strategy)
System model (logical) / Designer	Logical data model (data entity- relationship)	Application architecture (application function-user views)	Distributed system architecture	Human interface architecture (role - deliverable)	Processing structure (event- processing cycle)	Business rule model
Technology model (physical) / Builder	Physical data model (table- keys)	System design (Computer function - data elements)	Technology architecture hardware & software / line specifications	Presentation Architecture (User - screen format)	Control structure	Rule design (condition - action)
Detailed representation (out-of-context) / Subcontractor	Data definition (Field-address)	Program (language statement- control block)	Network Architect. (Address- protocol)	Security Architecture (Identity - Job)	Timing definition	Rule specification (sub- condition - step)

Table 1: Zachman framework for enterprise architecture (Saenz 2005, p51)

The five perspectives (audience) for which the product is designed:

- Planner: establishes the system scope, boundaries, order of magnitude, relevant constituents, and provides a contextual perspective (Saenz 2005)
- Owner: the recipient (customer, user) of the end (Saenz 2005)
- Product: for example airplane, house, enterprise (Zachman 2003)
- Designer: the engineer, the architect, the intermediary between what is desirable and what is physically and technically possible (Zachman 2003).
- Builder: the manufacturing engineer, the general contractor, the employer of some technical capacity for producing the end product (Zachman 2003).
- Sub-contractors: provides detailed representation and product specifications, including data definition, program (language statement), network architecture, security architecture, timing definition, and rule specifications. (Saenz 2005).

As for the model (content) prospective there are six described in the following:

- Data (What): the important objects to store data about data models and relationships (Saenz 2005)
- Function (How): the functional specification, the transformations for enterprises and the process models (Zachman 2003)
- Network (Where): where the components are located relative to one another (Zachman 2003)
- People (Who): who does what work, the manuals, the operating instructions for enterprises (Zachman 2003)
- Time (When): focusing on when events happen and life cycles (Saenz 2005)
- Motivation (Why): strategies for enterprises, similar to a control view (Saenz 2005).

#### *2.4.2. Open Group Architectural Framework (TOGAF)*

TOGAF is about set of techniques used to support enterprise architecture, it is an architecture framework developed by The Open Group Architecture Forum. First version was developed in 1995; it was based on the US DoF technical architecture framework for information management (TAFIM) (Josey et al. 2009). TOGAF is designed to support four types of architecture that are accepted as a subset from the enterprise architecture.

- Business architecture: The business strategy, governance, organization and key business process
- Data architecture: The structure of an organization's logical and physical data assets and data management resources
- Application architecture: A blue print of the individual application systems to be deployed, their interactions, and their relationships to the core business processes of the organization
- Technology architecture: the logical software and hardware capabilities that are required to support the deployment of business, data, and application services. This includes IT infrastructure, middleware, networks, communications, processing, and standards (The Open Group 2006).

The Architecture Development Method (ADM) is the main component for TOGAF. It describes how to drive the organization enterprise architecture. Figure 10 below is showing the different phases of TOGAF that are known as Architecture Development Method (ADM).

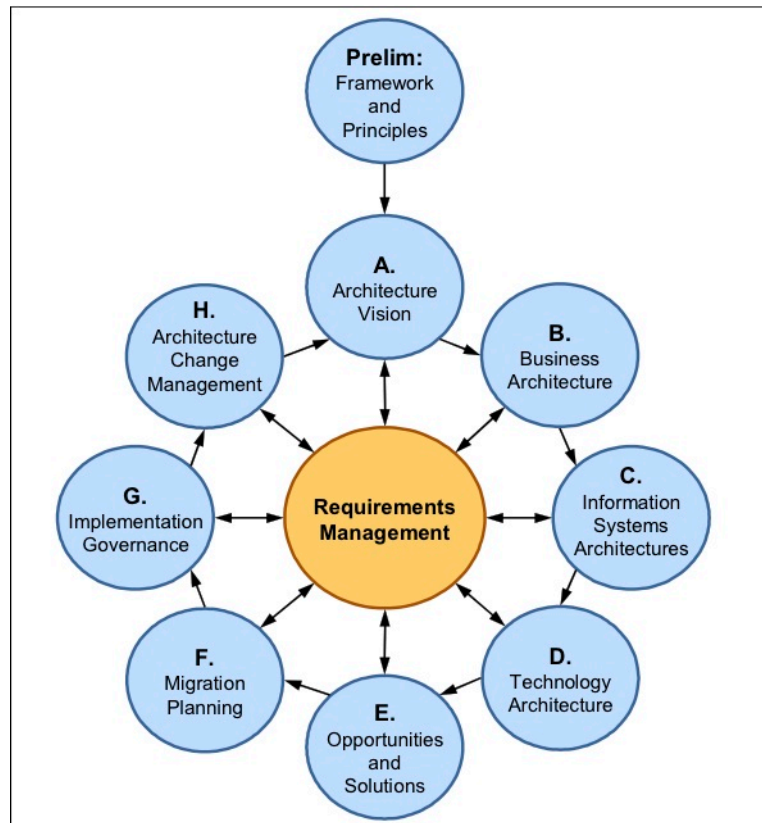


Figure 10: TOGAF ADM phase model (Jensen, Cline & Owen 2011, p95)

As per TOGAF9 guide, ADM provides guidance for architects. It has development phases that can go in a cycle around the ADM, around single phase and iterating between phases. Also it provides details for the phase objective, approach, input, steps and outputs. This can ensure addressing the requirements in a sufficient way leaving no exceptions.



Table 2 below summarizes the description of each phase (Josey et al. 2009):

ADM Phase	Activity
Preliminary	Preparing the organization and introducing the enterprise architecture framework to the business
Requirements management	TOGAF is about validated requirement that are identified, stored and fed into and out of the relevant ADM phases.
A. Architecture vision	This phase involves setting the expectations from the framework and obtaining the approvals.
B. Business Architecture C. Information systems D. Architecture Technology architecture	Develop the architecture at the three levels, at each level the baseline is developed and the target architecture is defined.
E. Opportunities and solutions	Perform initial implementation planning and the identification of delivery vehicles for the building blocks identified in the previous phases. Identify major projects and group them into transition architecture.
F. Migration planning	Develop detailed implementation and migration plan.
G. Implementation governance	Ensure that the implementation project conforms to the architecture.
H. Architecture change management	Provide continual monitoring and a change management process to maximize the value of the architecture to the business.
Table 2: Description of TOGAF ADM phases (Josey et al. 2009)	

#### 2.4.3. Federal Enterprise Architecture Framework (FEAF)

As per Congressional research services (2008, p3), FEAF is designed to “ensure that IT investments support the functions of government, rather than allowing technology choices determine how the government carries out its operations”. The federal CIO issued the FEA in September 1999, and it was declared as “conceptual model that begins to define a documented and coordinated structure for cross-cutting businesses and design developments in the Government” (Congressional research services 2008, p2).

OMB CircularA-11 updated in July 2010, requires from all federal agencies to align its major IT investments with each reference model within the FEA framework (OMB 2010) before getting budget approval.

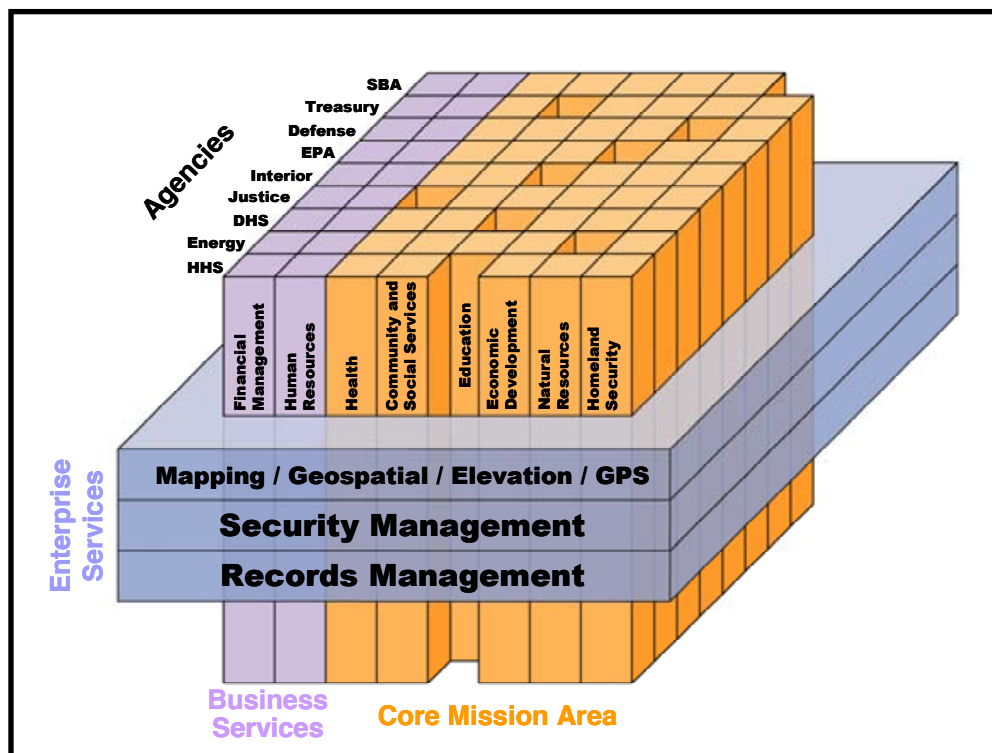


Figure 11 : Segments and services (Enterprise Architecture) (OMB 2007, p3)

The above figure 11 illustrates the relationship of segments across multiple agencies. A single agency contains both core mission area segments and business service segments. Enterprise services are those crosscutting services spanning multiple segments (OMB 2007).

FEA is built around five reference models (Congressional research services, 2008):

- Performance reference model: a framework for measuring the output of major information technology investments and their contributions to program performance
- Business reference model: a framework for describing the federal government business operations independent of the agencies that performs them
- Service Component reference model: a framework for identifying information technology service components (applications) used to support business and/or performance objectives
- Data reference model: a framework that, at an aggregate level, describes the data and information used to support government program delivery and business operations
- Technical reference model: a framework for describing the standards, specifications, and technologies that support and enable the delivery of service components (applications) and capabilities.

## **2.5. Business Process Automation (BPA)**

In the previous sections of chapter one, EA concept and EA framework were described. In this section, the BPA will be explained. Business process automation concept declared by Tatum (2011, p1) as “Business process automation, or BPA, is a strategy that is used to optimize and streamline the essential processes used to operate a business, using the latest technology to automate the functions involved in carrying out those processes.”

In some references they refer to the business process automation as a baseline for the workflow automation technology. A workflow basically is a connected step for a business process, which might come across with another workflow as an input or output. Workflow is "A sequence of structured or semi-structured tasks, performed in series or in parallel, by two or more individuals, to reach a common goal"(Rashid 1999, p1).

The value behind implementing automated workflow is that it can, enforce the policies and procedures inside the organizations, which could reduce the cost and the effort of training. It can enforce law and reduce error. The implementation of business process automation can be done in through different technologies, an example, ERP, CRM and content management system. Adding to that, workflow management systems (WFMS) technology has been widely used recently to support the collaboration between the different parties in the business process. In the public sector, the adoption of the workflow process results primarily in enhanced effectiveness and efficiency seen in cross-functional departments (Sajjad et al. 2011).

However, in today's technology approaches, a new concept called Services Oriented Architecture (SOA) has been introduced to deliver the business as services. The business process automation can be as underlined layer for the SOA. When SOA applied to business processes automation, the business logic represents by the business processes, which are the performed activities to deliver an output (Veger 2008).

Arsanjani (n.d. in Knippel 2005, p17) stated, "SOA is not a product, it is about bridging the gap between business and IT through a set of business-aligned IT services using a set of design principles, patterns and techniques". In other words, SOA is a form of technology architecture that adheres to the principles of service orientation. When realized through the web services technology platform, SOA establishes the potential to support and promote these principles throughout the business process and automation domains of an enterprise (Knippel 2005).

## **2.6. Rational behind enterprise architecture implementation with business process automation**

As explained earlier in the introduction chapter, the organizations are looking to position the technology as a value center that drives the business process efficiency. Having said that, not all the business processes necessary need to be automated. There are key processes, which should be selected through an evaluation criterion. The cost of process automation varied based on the environment complexity.

When the organization selects an existing business service to be automated using information systems, these services will depend on another system services, these services require or produce information forming blocks of data entities. The need for integration depends on an organization's operating model, which shows the business requirement for integration of business process or sharing data across business areas (The open group 2008).

The rapid rate of changes in market demands, will force the organizations to accelerate the process or enhancements, accordingly, there is a high risk of automating the wrong function or using the wrong technology (The open group 2008). Moreover, it is very hard to gather the business needs or the organization objectives, as it can be implicit or explicit.

The Open Group (2008, p8)“In order to ensure that the organization's goals, objectives, measures, and requirements are met, they can be distilled into qualitative statements of business need or principles, which can then be used to govern the organization's transformation”.

Architecture models or blocks can be used to describe the aspects of the organization. As part of EA implementation conducted by Chi (2006), he evaluated the value of the business principles, which was captured in the enterprise architecture; Chi's (2006) evaluation focused on how well the business principles can be applied in practice. Chi (2006) chose three projects to examine the compliance with the business principles related to customer relationships. The projects were, unique voice portal, call management and customer information management. The evaluation shows the focus on the principles, although there were some principles that did not comply, these can be identified for business improvement.

## **2.7. Business process automation matters**

After introducing the EA and BPA idea in the earlier sections, we need to understand what are the related issues to BPA projects. To start this task, first we need to look at the project management issues. The project management experts have been studying the factors which can affect the project success over many years, figure 12 below showing the top ten success factors in projects as per CHAOS (2009) report, the user

involvement, executive's support and clarity of the business objects were rated very high.



Figure 12: Projects success factors (CHAOS 2009, p3)

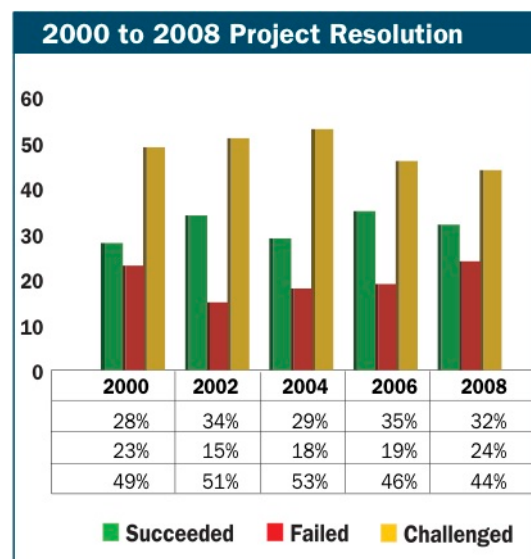


Figure 13: Project resolution (CHAOS 2009, p1)

Having that said, business process automation considered an IT project and in practice business process automation surrounded with many types of risk, these problems related to the business environment, for example the constant changes to the business requirements increased due to the business competition (Knippel 2005). To gain a better sight to the issues that can cause a failure to the IT projects, a classification to the failure was proposed by Lyytinen and Hirschheim (in Jacobs 2008):

- Correspondence failure: when the business requirements are not met

- Process failure: when the project runs over time or budget and performance is unsatisfactory
- Interaction failure: if there are problems related to the use of the system or when the system is hardly used
- Expectation failure: a superset of the above three types of failures, when stakeholders' expectations cannot be met.

The correspondence failure is our concern in this research, among many references, defined business process was found to be the most critical success factors on successful information system implementation (Jacobs 2008). Jacobs (2008) highlighted the importance of the well-defined business processes; also dose Hammer and Stanton (1999 in Jacobs 2008) and Paul and Serrano (2003 in Jacobs 2008). As example, the ERP cannot be of a real value to the business if the business process are not integrated (Jacobs 2008).

Jacobs (2008) research concludes the dependency between the quality of the business requirement and the understanding of the business requirements by the stakeholders and the successful automation of business processes through information technology systems. On the other hand Jacobs (2008) studied the causes for the quality of business requirements, one factor was the Business Process Re-engineering (BPR), it was found that BPR drives the information systems toward achieving the desired outcome (Caron, Jarvenpaa & Stoddard 1994 in Jacobs 2008).

Another factor is the application evaluation, when organization tries to implement a new information system, the evaluation for this information system will be mainly dependent on the business requirements, and how the system will be used inside it (Mende, Brecht & Osterle 1994 in Jacobs 2008). Evaluating the information systems should not be dependent on the IT requirement only; it should be combined with the business requirement. Compatibility is also factor in the business requirements quality, the desire for potential adopters and innovation should be part from the business requirements (Larsent 2001 in Jacobs 2008).

Drori (1997 in Jacobs 2008, p22) identified the “partial understanding of the information given by the user is one of the pitfalls during the systems analysis and the definition of the business requirements stage”. Moreover, software process improvement can be successful if it is linked with the business alignment and orientation (Jacobs 2008).

Adding to the above factors related to quality of business requirements, is the modeling of business processes, which found to be a critical success factor to the business process re-engineering (Jacobs 2008). Kaisler, Armour and Valivullah (2005 in Jacobs 2008, p22) indicated, “It is essential to describe and understand enterprise architecture”. One last factor to the quality of business requirements is the persistent questioning of the information system value to the business (Jacobs 2008).

Looking into specific examples for issues related to one of the recent used technology for business processes automation, which is SOA, Knippel (2005) listed the most faced issues with the SOA implementations, illustrated in table 3, all of the issues are not technical related.

Title	Implementation strategy - including a transition plan
Description	One of the big advantages of SOA is the possibility to make an incremental implementation and transition. However this requires a strategy on how to get from the “current state” to the “target state” [24].
Title	Evolution
Description	A SOA must be developed over time. The possible agility to gain from SOA does not come “in the package” but is a continuous effort.
Title	Organisation support
Description	Buy in from the organisation must be ensured. SOA affects the entire business. All processes in the business must be seen as Services in a SOA context.
Title	Monitoring Return On Investment (ROI)
Description	One of the SOA promises is to increase the ROI [22]. The actual benefits must be monitored in order to improve the weak points and learn from the good. Different parts of SOA can have a very different time-scope on ROI [12].
Title	Quality control
Description	Providing a Service for consumption means potentially providing for the entire business. This requires that all Services are subjected to continuous quality control.
Title	Service Oriented Development Method (SOAD)
Description	The introduction of SOA will change how development projects are executed [26].
Title	Concept definition
Description	SOA being a relative new concept must be defined for the business.
Title	Information architecture
Description	Communication in SOA is based on messages between loosely coupled Services. In order to insure a common understanding of the content of these messages all data <sup>11</sup> must be defined in a common data model.

Table 3: SOA issues (Knippel 2005, p20)



Knippel (2005) also have identified in the study how the EA could support in overcoming these issues, SOA issues and how it is related to EA are listed in table 4 below.

SOA	Implementation strategy - including a transition plan
EA	- Current Architecture: Views of as-is strategies, processes, and resources - Future Architecture: Views of to-be strategies, processes, and resources - EA Management Plan: A plan to move from the current to the future EA
SOA	Evolution
EA	- EA Approach: A modelling framework and implementation methodology
SOA	Organisation support
EA	- Decision Support: Financial control and configuration management
SOA	Monitoring ROI
EA	- Decision Support: Financial control and configuration management
SOA	Quality control
EA	- Standardized Policy: Resource governance and implementation
SOA	Service Oriented Development Method (SOAD)
EA	- Standardized Policy: Resource governance and implementation
SOA	Concept definition
EA	- Resource Alignment: Resource planning and standards determination
SOA	Information architecture
EA	- Resource Alignment: Resource planning and standards determination

Table 4: SOA and EA relation (Knippel 2005, p20)

## 2.8. Summary

Chapter two covered the literature review related to the enterprise architecture definition, value and relation to the business process automation. It included a description for three of the EA frameworks, in order to understand more the value from the EA and its function. Chapter two also covered the definition of the business process automation with the attached risks to it; the identified risks or matters will be used in the methodology as an input to design the survey and interview questions.

### **3. Methodology**

This chapter will cover the methodology that will guide this research. First section contains the selected approach and the rational behind it in answering the research question. Second section covers the discussion to justify the data collection sampling approach. Third section will describe the instrumentation that will be used and its characteristics, which will help in collecting the required data. Following that are sections of validity, reliability, procedure and finally the limitations of the proposed methodology.

#### **3.1. Research methodology design**

There are many reasons for initiating a scientific research, you can prove, disprove or question a hypothesis, new facts might also be generated from the research; but, the research has to be of a value and significant to the community. The result out of this research should answer the question:

“How dose implementing enterprise architecture framework affects the business processes automation initiatives? ”

In the domain of enterprise architecture frameworks, there have been many records of researches through thesis, particularly around the business value. Also, decision makers become more aware of the impact of selecting the wrong approach, especially during the last few years, when most of the companies and organizations have gone under budget reduction. As a result, the scientific researches can help the decision makers in the process of decision-making, by providing proven facts, tools and applied methods to produce a guideline or justification to the decisions.

As this research is covering the enterprise architecture topic and it is a newly concept at the government organizations in UAE, thus, an empirical research at this area, will build a good knowledge base for the decision makers.

### 3.2. Empirical research

The research will be of an empirical type, qualitative and quantitative data will be analyzed to gain the knowledge for answering the research question. “Empirical Research is research that is based on experimentation or observation, i.e. Evidence. Such research is often conducted to answer a specific question or to test a hypothesis ”(Manor college 2006, p1). Empirical research will be used to capture the data to learn, explore and confirm the theoretical concepts. The research cycles consists of (Observation, Induction, Deduction, Testing and evaluation), observations is about collecting the empirical facts, induction is to start formulation the hypothesis, deduction is phase to deduct the consequences of hypotheses as testable predictions, then to test the hypothesis and finally evaluating the result of testing (Manor college 2006).

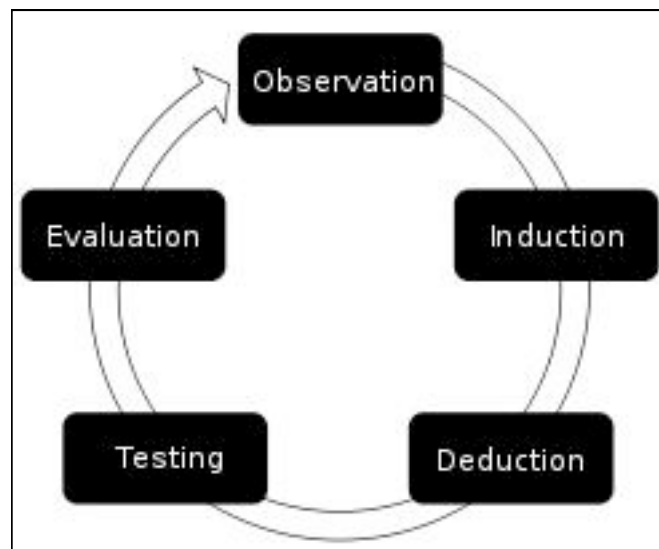


Figure 14: Empirical cycle (Manor college 2006, p1).

The below research questions should be answered using empirical methods:

RQ1-A: What are the issues and risks encountered during the implementation of business process automation projects?

RQ1-B: What is the root causes for the issues collected from RQ1-A?

RQ1-C: What success factors can be obtained based on the result of RQ1-B?

RQ2-A: How dose the technology solution selected to be used for the Information systems?

RQ2-B: How is the processes to be automated are selected?

RQ2-C: Is there any hindering reasons for not implementing enterprise architecture?

The above questions can be answered through exploratory studies, assessment studies, hypotheses test and observation experiments, and its all related to empirical studies, in addition its supports using quantitatively or qualitatively data.

### 3.3. Hypothesis and research question

From the research question, a one-tail hypothesis is created and sub-questions to help answering the research question.

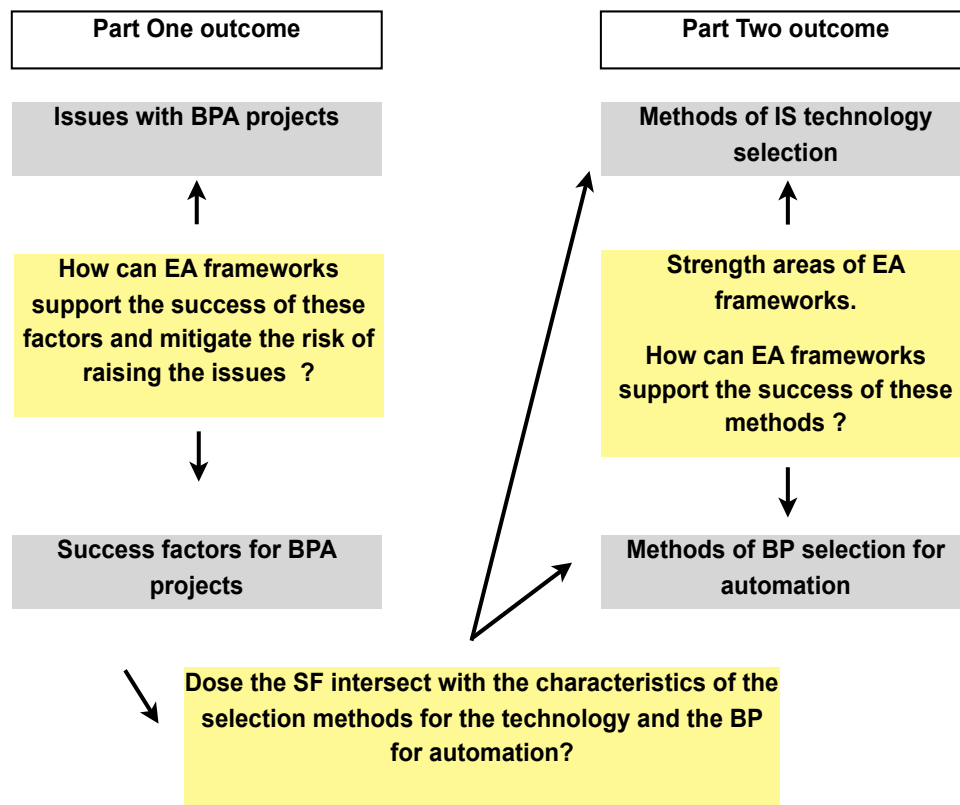
Research main question: “How dose implementing enterprise architecture framework affects the business processes automation initiatives?”

The hypothesis will be as follows:

H1: The EA framework implementations supports the success of BPA projects

H0: The EA framework implementation fails the BPA projects, or there is no impact.

In order to test the hypothesis and answer the research question, a set of sub-questions have been created as explained in section 3.2. The below diagram is showing the connection between the questions results of part one and two, also how the EA could intersect between the results from both parts.



### 3.4. Limitations of empirical research

While the empirical research can support the research objectives, but empirical research has its limitations. This research will use hypothesis approach; this hypothesis testing procedure is responsible for an important limitation of empirical research. Empirical studies are very good at identifying design errors and wrong assumptions but they do not suggest new theories or approaches directly. Even an explorative study requires some hypotheses about possible impact factors. Thus, empirical evaluations have to be combined with theoretical grounds to yield useful results (Weibelizahl 2010). In addition to that, empirical research relies on the validity of the collected data, it could be not reliable enough.

### 3.5. Data collection

The research data collection will depend on distributed survey and structured interviews, the target is the government organizations in UAE, business decision makers and IT team will be the main target. However, it is very difficult to collect the data from all the population under this category. So, a scientific sampling method has to be used. In this research non probability sampling will be used, it dose not involve random selection, as the target population has to be from two groups the IT and business units, non-proportional quota sampling is the subcategory from non probability method, using this sampling, a minimum number of sampled units can be specified for each category IT and business units. Five percent minimum respondents have to be from the IT category, and not more than 50% of the total respondents. This is to assure getting adequate feedback from the business and not to be bias to the IT responses.

The below table is showing how is the data will be collected and from whom for this research:

Question code	Size of the sample	Quantitative/qualitative data	Where and from whom the data will be collected
RQ1-A	At least 5% of the respondents has to come from IT units,	Quantitative data will be used as it is time saving and can be formed in a	1- Literature Review will be used for two things, first, to be used as initial data in
RQ1-B			
RQ1-C			

	and not to exceed 50%	presentation figure easy to read. Also it can obtain large responses.	designing the survey, second, to link the responses with previous related work 2- Using questionnaire, it will be distributed to IT and business units in UAE government organizations.
RQ2-A	CIO or the head of the IT from four government organizations	Qualitative method will be used through the interviews to gather detailed information about the technology evaluation process and business process selection .	1- Literature Review will be used to link the responses with previous related work 2- Interviews with IT and business decision makers, in UAE government organizations, these organizations must have implemented BPA projects.
RQ2-B	At least four business decision makers from four government organizations		
RQ2-C	CIO or the head of the IT is mandatory, and another three heads for business units from four government organizations		

### 3.6. Instrumentation

Interviews and surveys will be used to collect the required data for answering the research sub-questions.

#### 3.6.1. Interviews method

To be able to answer the questions in part two, a comprehensive details are required. A face-to-face interview approach will be used a research method. The aim from interviews is to collect detailed information and have a chance to clarify and explain what is expected form the question to the interviewee. According to Berg (1998 in Niemann 2005) in the in-depth interviews the researched initiates a dialogue with a real person as new questions can be triggered while getting answers for deeper understanding.

However, this method has some advantages and disadvantages, which should be mentioned to identify any limitations for this research methodology.

Face to face interview advantages:

ADVANTAGE	AUTHORS
<ul style="list-style-type: none"><li>• Face-to-face interviews have the highest response rates and permit the longest questionnaires.</li></ul>	Babbie (1992:269)
<ul style="list-style-type: none"><li>• These interviews can be used with people who could not otherwise provide information, such as respondents who are illiterate, blind, bedridden or very old.</li></ul>	Singleton, Straits, Straits and Mcallister (1988:243)
<ul style="list-style-type: none"><li>• Interviewers can also observe the surroundings and use non-verbal communication and visual aids. In this regard, well-trained interviewers can ask all types of questions, can ask complex questions, and can use extensive probes.</li></ul>	Babbie (1992:269) Bernard (2000:230) Neuman (2000:272)

Table 5: Advantages of face-to-face interviews (Niemann 2005, p193)

Face to face interview disadvantages:

DISADVANTAGE	AUTHORS
<ul style="list-style-type: none"><li>• High cost is the biggest disadvantage of face-to-face interviews.</li></ul>	Neuman (2000:273)
<ul style="list-style-type: none"><li>• The training, travel, supervision and personnel costs of interviews can be high.</li></ul>	Babbie (1992:269)
<ul style="list-style-type: none"><li>• Interviewer bias is also greatest in face-to-face interviews. The appearance, tone of voice, question wording, and so forth of the interviewer may affect the respondent.</li></ul>	Babbie (1992:269) Bernard (2000:230) Neuman (2000:273)
<ul style="list-style-type: none"><li>• Interviewer supervision is less than in telephone interviews, which supervisors monitor by listening in.</li></ul>	Singleton <i>et al.</i> (1988:243-244)

Table 6: Disadvantages of face-to-face interviews (Niemann 2005, p193)

It has to be mentioned that, due to the nature of this research, which is the domain of government organizations, the risk of bias interviewees is believed to be very high.

### 3.6.2. Interview design

First the interview approach will be used to answer the questions of part two which are:

RQ2-A: How dose the technology solution selected to be used for the Information systems?

RQ2-B: How is the processes to be automated are selected?

RQ2-C: Is there any hindering reasons for not implementing enterprise architecture?

The interview will start with introduction to the university and the research aim and objectives, following that an introduction to the research significant to the organizations. A confidentiality and privacy statement will be mentioned to the interviewee before starting the interview.

The introduction will be in English or Arabic; it depends on the interviewee preferences, below is a detailed context for the interview introduction and questions:

Introduction statement:

I want to thank you for taking the time to meet with me today. My name is Salama aldhaheri and I would like to talk to you about your business process automation projects. I am assessing the different approaches that are used to select the technology or the processes for the purpose of BPA initiatives.

The interview should take less than an hour. I will be typing the session on my laptop. Please be sure to speak up so that i do not miss your comments.

All responses will be kept confidential. This means that your interview responses will only be shared with research team members and we will ensure that any information we include in our report does not identify you as the respondent. Remember, you don't have to talk about anything you don't want to and you may end the interview at any time.

Are there any questions about what I have just explained? Are you willing to participate in this interview?

The first part from the interview will be directed to the decision makers in the IT units or the CIO, to answer the research sub-question for part two:

RQ2-A: How dose the technology solution selected to be used for the information systems?

Below are list of more questions to guide the answer to the above sub-question:

- Do you have any process automation projects? What are they?
- Who owns these applications?
- Do you consider integration the applications and provide the business as a services, such as the approach of SOA?
- How are the applications describes the business processes?
- How do you describe the relation between the IT and business stakeholders in



supporting the business process automation?

- Do you have any strategy to purchase the information systems or any other technology for business process automation?
- Can you describe to me the process?
- Would you please give me an example?
- What did you think of this strategy?
- What would you do differently next time? Please explain why?
- How do you describe the relation between the IT and business stakeholders in supporting the business process automation?

The second part from the interview will be directed to the business decision makers in the organization, this part should answer the research sub-question for part two:

*RQ2-B: How is the processes to be automated are selected?*

Below are list of more questions to guide the answer to the above sub-question, it is to understand in deep how is the business processes described, documented and implemented through business process automation.

- Do you have any process automation projects? What are they?
- Who owns these applications?
- Dose the business processes described as services?
- Do you have any strategy to identify the business process, which needs automation?
- Can you describe to me the process?
- Would you please give me an example?
- What did you think of this approach?
- What would you do differently next time? Please explain why?
- How do you describe the relation between the IT and business stakeholders in supporting the business process automation?

The final part of the interview is question:

*RQ2-C: Is there any hindering reasons for not implementing enterprise architecture?*

This question will be asked to both, IT and business decision makers and will be used for future recommendations.

In order to guide the interviewee to provide detailed information for the above question,

the below questions will be used during the interview:

- To what extend you know about the EA frameworks?
- After hearing from me more about the EA, do you think you would like to implement it? Why?
- What effect, if any, do you feel the EA project will have on the organization?
- What do you think will be the barriers for implementing EA at your organization?
- How can you overcome these barrier(s)?

### *3.6.3. Survey method*

An online questionnaire distributed electronically to the population will be used in this research, only part one of questions will be used for the questionnaire. This method has some advantages and disadvantages it is listed below:

#### Survey Advantages

- There is a privacy feature
- Low cost
- Standardization of the gathered data
- Excellent change to get large portion of responses.

#### Survey Disadvantages

- The method is not flexible, as there is a set of fixed questions
- No type of open-ended questions
- The researched cannot judge the quality of response.

### *3.6.4. Survey Design*

The one line questionnaire will be used to answer the questions of part one, which are:

RQ1-A: What are the issues and risks encountered during the implementation of business process automation projects?

RQ1-B: What is the root causes for the issues collected from RQ1-A?

RQ1-C: What success factors can be obtained based on the result of RQ1-B?

The literature review of section 2.7 contributed in the questions design, however, an open text option will be added to collect answers that did not come a cross during the literature review.

Introduction to the university and the research aim and objectives	
Introduction to the research significant to the organizations	
Confidentiality and privacy statement	
Part one: Respondent general information that is required to filter and clean the data to analyze the categories required for the research.	
<p>Contact information:</p> <p>Q1: First name</p> <p>Q2: last name</p> <p>Q3: phone number</p> <p>Q4: email address</p> <p>Q5: Organization category:</p> <p>Local-government, Federal-government, Semi-government, Other</p> <p>In this research, the focus is on UAE government organizations</p> <p>Q6: Department: IT, Business</p> <p>The responses has to be maximum 50% from each category</p> <p>Q7: How many persons are working at your organization:(1-100/100-1000/1000-10000/10000-25000/25000-50000/&gt;50000)</p> <p>Q8: How many persons working at your IT department: (1-10/10-100/100-500/500-1000/1000-10000/&gt;10000)</p>	
Part two: Questions related to RQ1-A(What are the issues and risks encountered during the implementation of business process automation projects?)	
Q9: Did your organization Implemented application or information system used to automate your business process?	<p>Yes</p> <p>No</p>
Q10: What applications are you using at your organization:	<ul style="list-style-type: none"> <li>Enterprise resources planning (ERP for HR, Finance, Payroll, Procurement)</li> <li>Customer Relation</li> </ul>

	<p>management (CRM)</p> <ul style="list-style-type: none"> <li>• On line self services</li> <li>• Enterprise content management or Document management system</li> <li>• Scanning and archiving system</li> <li>• Workflow management system or electronic business process workflow</li> <li>• Other applications that automate one or more of your core business activities.</li> </ul>
Q11: Are you satisfied with the performance and outcome from the applications you selected in the previous question?	<ul style="list-style-type: none"> <li>• Very Dissatisfied</li> <li>• Not Satisfied, a lot of issues</li> <li>• Satisfied, few issues</li> <li>• Very Satisfied</li> </ul>
<p>Q: 12 Describing your organization, what do you think for the below statements:</p> <ul style="list-style-type: none"> <li>• IT projects rarely fail to deliver the business value.</li> <li>• The IT strategic initiatives are linked with the organization strategy</li> <li>• The decisions to obtain new IT solutions are justified and supported by business value</li> <li>• IT projects achieved the expected return of investment (ROI)</li> <li>• Users are satisfied with the quality of services provided through the business</li> </ul>	<p>Multi points scale:</p> <ul style="list-style-type: none"> <li>• Strongly disagree</li> <li>• Disagree</li> <li>• Undecided</li> <li>• Agree</li> <li>• Strongly agree</li> <li>• Not applicable</li> </ul>

<p>process automation</p> <ul style="list-style-type: none"> <li>• There is a clear roadmap between IT and business to transition between current situation of business process automation (as-is) to future (to-be) situation</li> <li>• The business processes of your organization are clear and well defined</li> <li>• The business processes of your organization are maintained and updated periodically</li> <li>• The performance of business processes at your organization are measured periodically for improvement chances</li> </ul>	
<p>Third: Questions related to RQ2-B: (What are the root causes for the issues collected from RQ1-A?)</p>	
<p>Q: 13 Describing your organization, what do you think for the below statements as root cause for the business process automation issues:</p> <ul style="list-style-type: none"> <li>• Business requirements and needs are not clear a cross the organization.</li> <li>• Lack of communication between IT and business units</li> <li>• Stakeholders are not involved in the projects</li> <li>• Lack of support from the organization to the project</li> <li>• Organizations processes needs improvement</li> <li>• Dynamic changes to the business environment</li> <li>• For the business process automation there are redundant systems supports the</li> </ul>	<p>Multi points scale:</p> <ul style="list-style-type: none"> <li>• Strongly disagree</li> <li>• Disagree</li> <li>• Undecided</li> <li>• Agree</li> <li>• Strongly agree</li> <li>• Not applicable</li> </ul>

<p>same business and produce the same outcome.</p> <ul style="list-style-type: none"> <li>• The technology used in the business process automation is not compatible with the business requirements.</li> <li>• The technology used in the business process automation is not compatible with the existing technology environment.</li> <li>• Existing technology for business process automation have difficulties to integrate or connect with others.</li> <li>• Other (please specify):</li> </ul>	
<p>Fourth: Questions related to RQ1-C: (What success factors can be obtained based on the result of RQ1-B?)</p>	
<p>Q14: What do you think of the below statements as success factors for business process automation projects:</p> <ul style="list-style-type: none"> <li>• Strategy alignment between IT/business</li> <li>• Requires clear and documented business requirements</li> <li>• Business process re-engineering where applicable</li> <li>• Stakeholder's involvement in the project to support decisions.</li> <li>• Using a measured mechanism and tool for decision support</li> <li>• Monitor and track performance of business processes with its IT services</li> <li>• Enhance the evaluation of new technology or systems in regard to the business value and avoid redundancy</li> <li>• Existing technology needs continues</li> </ul>	<p>Multi points scale:</p> <ul style="list-style-type: none"> <li>• Strongly disagree</li> <li>• Disagree</li> <li>• Undecided</li> <li>• Agree</li> <li>• Strongly agree</li> <li>• Not applicable</li> </ul>

<p>assessment against business requirements and changes</p> <ul style="list-style-type: none"> <li>• Other (Please specify):</li> </ul>	
<p>Fifth: If the organization has EA implementation the below questions will be offered, the questions was selected from similar survey study by IFEAD (2005).</p>	
<p>Q15: Why is EA important for your organization?</p>	<ul style="list-style-type: none"> <li>• Supports outsourcing</li> <li>• Helpful in mergers</li> <li>• Delivers road maps for change</li> <li>• Support business and IT budget prioritization</li> <li>• Manages the IT portfolio</li> <li>• Support systems development</li> <li>• Delivers insight and overview of business and IT</li> <li>• Managing complexity</li> <li>• Supports decisions making</li> <li>• Other (Please specify):</li> </ul>
<p>Q16: For what kind of issues do you plan and EA program:</p>	<ul style="list-style-type: none"> <li>• ERP</li> <li>• Business change</li> <li>• Legacy transformation</li> <li>• Infrastructure renewal</li> <li>• Mergers/Acquisition</li> <li>• Application renewal</li> <li>• Transformation road map</li> <li>• Business - IT alignment</li> </ul>
<p>Q17: Dose your organization familiar with the importance of EA?</p>	<p>Yes</p> <p>No</p>
<p>Q18: Is your EA part of your organizations strategic governance?</p>	<p>Yes</p> <p>No</p>
<p>Q19: Are there any laws or regulations related to EA enforced by the government?</p>	<p>Yes</p> <p>No</p>

Q20: What kinds of architectures are established in your organization?	<ul style="list-style-type: none"> <li>• Software</li> <li>• Governance</li> <li>• Security</li> <li>• Technology infrastructure</li> <li>• Information systems</li> <li>• Business</li> <li>• Enterprise architecture</li> </ul>
Q21: At which level is enterprise architecture part of your organization governance structure?	<ul style="list-style-type: none"> <li>• IT management</li> <li>• Middle management</li> <li>• Top management</li> <li>• Management board</li> <li>• Other (please specify)</li> </ul>
Q22: What kind of EA frameworks dose your organization use:	<ul style="list-style-type: none"> <li>• Zachman</li> <li>• FEAF</li> <li>• TOGAF</li> <li>• IAF</li> <li>• USA DoD</li> <li>• ISO/IEC 14252(IEEE std 1003.0)</li> <li>• TAFIM</li> <li>• TEAF</li> <li>• E2AF</li> <li>• Organization own</li> <li>• Blinded from more than one of the above frameworks</li> <li>• Other</li> </ul>
Q23: What kid of EA tools is your organization using?	<ul style="list-style-type: none"> <li>• Aris</li> <li>• MS office tools (word,excel,power point)</li> <li>• Teleogic</li> <li>• Ptech</li> <li>• Casewise modeler</li> </ul>



	<ul style="list-style-type: none"> <li>• Troux'Metis'</li> <li>• MEGA</li> <li>• Other</li> </ul>
--	---

### **3.7. Research validity and reliability**

Validity of the findings is a concern for the questioners approach, however by conduction interviews, the data validity will be much higher, as the risk of misunderstanding the questions will be reduced. The results reliability will be tested through a comparison with the collected literature review, to find out if there are any similarities, Moreover, by working with both questioners and interviews, the risk of getting biased responses will be reduced.

### **3.8. Methodology procedure**

The two types used in this research are interviews and questionnaire. For the questionnaire, an online survey will be implemented and distributed to the target population electronically using, emails, Facebook, iPhone and BlackBerry.

As for the interviews, an appointment will be scheduled with the targeted people, at the beginning of the interview, an introduction will be given about the university program and researches role in the university, and then an introduction to the research subject will start. The interviewee will be asked for any ethical concerns before starting. A guideline in how to answer the question without bias will be communicated; the risk of giving bias information will be explained to the interviewee. After collecting the required data, the answers will be confirmed and reviewed in the concluding.

### **3.9. Research methodology limitations**

The research methodology has some limitations in the area of data validity and bias respondents as explained in the sections of empirical research and methodology instrumentations. However, the interview and the survey will be in both Arabic and English languages to facilitate the respondents task. The results will be translated back in English for the research document.

### **3.10. Summary**

The purpose of this chapter was to discuss the methodology approach in the empirical research of the study. The justification for using the qualitative and quantitative data was presented and linked to the research requirements. Also the method of sampling design and data analysis was clarified. For each part of the methodology, the limitations were identified and a mitigation or workarounds were suggested.

## 4. Findings and discussion

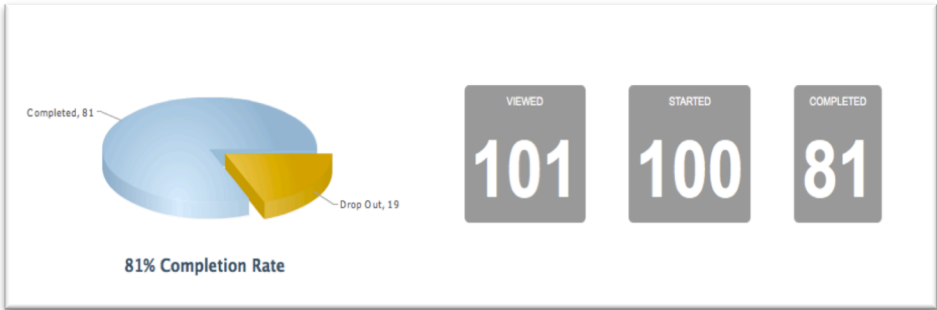
In this chapter the research methodology test will be discussed. The findings discussion will focus on answering the research question and sub-questions. The findings from the literature review will be discussed first and then the answers to the survey will be reviewed. Finally the results from the conducted interviews followed by a section to conclude the findings.

### 4.1. Survey results

Besides answering the research question and sub-questions, the survey was planned to test the collected data from the literature review and to explore any other factors that can affect the business processes automation.

The survey contained five sections, the first section was to collected general information, second and third sections to gather issues in the business processes automation projects and the root cause of these issues. Success factors were validated and collected in section four. Last section was about exploring information about EA implementations at the organizations.

The survey collected 81 respondents, 101 accesses the survey and 100 started but 19 have dropped the survey and did not complete it. The survey results are listed in appendix (B) for more details.



The collected data was validated against the targeted population, as illustrated in the survey results of question five and six, the data came from government organizations

only and the responses from IT employees didn't exceed the 50% as it was planned, and with a contribution from large organizations with a population between (100 to 10,000) as showed in the results of question number seven and eight.

Most of the respondents to question number nine and ten identified business process automation implementations in their organizations. Around 56% of these projects related to Enterprise Resource Planning (ERP), workflow management and other core business solutions.

Section two of the survey contributed in identifying the issues or risks that could be associated with business process automation projects, question number eleven, pointed out that around 90% of the respondents encountering issues with the performance of their automation projects, from the 90% there are 24% indicated a lot of issues and complete dissatisfaction.

Further more, when the respondents were asked to say what they think of the quality of services coming through the automated processes, only 43% agreed that the users are not satisfied with the quality, 47% indicated a satisfaction with the service and 10% did not decide.

In order to investigate deeper on the issues behind user dissatisfaction in business process automation performance, section three from the survey contains a collected statements from the literature review that are expected to describe the issues in the business process projects. The respondents were asked to describe their opinion about these statements. More than 50% of the responses highlighted great trust that IT projects rarely fail, supported by the business and aligned with the organization strategy. However there was not enough information whether these projects have returned on investment, this might be because these organizations are funded by the government and the practice of ROI is not yet mature and the data not yet formulated or published, but this research will not go deep on this matter as its out of the research scope.

On the other hand, between 53% and 60% responses disagree with the below statements and 10% did not decide about it:

- There is a clear roadmap between IT and business to transition between current

situation of business process automation (as-is) to future (to-be) situation

- The business processes of your organization are clear and well defined
- The business processes of your organization are maintained and updated periodically
- The performance of business processes at your organization are measured periodically for improvement chances

The above statements pointing to a business processes concerns and not a technology issues.

In section three, statements of an expected root causes for the unsatisfactory of the business process automation projects were listed, respondents were requested to provide their judgment about it. The result shows that the root cause can be less effective if it is related to the organization support or the stakeholder participation. Also there was no clear trend of having a communication problem, 50% did not think the communication between IT and business is a root cause. The dynamic change in the organization process was not listed as an important root cause; only 34% identified it as a root cause, which shows a support from the government and the organizations to the IT projects.

Instead, 61% agrees that business requirements clarity across the organization is a main root cause for the issues related to business process automation and 50% agreed that if the organizations didn't improve its processes before engaging in an automation project, the automation project will have issues, which has been proven in the literature review as well.

On the other hand, although there was 50% who disagree that the technology is not supporting the business requirements and 51% disagree that the technology is not compatible with the existing IT environment, but 60% respondents agreed that existing technology for business process automation have difficulties to integrate or connects, and 65% respondents highlighted the redundancy in the information systems as a root cause, on other words, there are some applications can deliver or store the same information causing a redundancy. This contradiction shows that organizations are facilitating the acquisition of high-end technology but the linking to the business

processes could be hindrance to deliver the business value.

For the same section of the survey, the respondents specified in the free text question number of other root causes listed below:

1. IT outsourcing initiatives affecting the internal business process delivery
2. Sharing the IT infrastructure or applications with other organizations which have different business requirements
3. Organization strategy not clear or mature.

The fourth section of the survey, presented a success factors for the business processes automation projects obtained from the literature review, the respondents ordered the importance of these success factors as below:

1. Monitor and track performance of business processes with its IT services
2. Requires clear and documented business requirements
3. Using a measured mechanism and tool for decision support
4. Strategy alignment between IT/business
5. Stakeholder's involvement in the project to support decisions
6. Enhance the evaluation of new technology or systems in regard to the business value and avoid redundancy
7. Existing technology needs continues assessment against business requirements and changes
8. Business process re-engineering where applicable

There are other success factors mentioned by the respondents in the free text question, classified in the category of expert human resources and benchmark exercise.

The last section in the survey focused on the organizations that have implemented the EA, it was found that 69% identified what is EA but did not implement it, 22% do not know what is EA and only 9% implemented the EA.

It was interesting to find that 100% of the respondents from organizations, which implemented EA, have an existing government regulation forcing the organization to use the EA and its part of the IT governance. This regulation came from Abu Dhabi

System and Information Center (ADSIC) the technology arm for Abu Dhabi government (ADSIC 2011). The survey also showed the highest leading reasons for starting EA program, which were prioritization business and IT budget, manage the IT portfolio and manage the complexity.

Moreover, the survey results identified the legacy transformation, infrastructure renewal and business-IT alignment were the issues for which EA planned to support

The EA found to be in the IT management organization as per 77% of the respondents and its newly introduced, therefor 42% indicated that the organization is not aware of the EA program.

Although the results of section five were not sophisticated and the number of respondents were only seven, but this was expected as the EA concept in UAE government newly introduced in the past few years.

## **4.2. Interview results**

The interviews included sixteen participants from four government organizations in Abu Dhabi the capital city of UAE, four of them were IT senior managers and the other twelve were senior executives and decision makers. Each interview took about 20-30 minutes, not all of the interviewee participated by answering with questions in details, as most of them have less free time, as a results most of the questions were answered in short statements.

The interview objectives were to gather detailed information about the process of initiating a business process automation projects in regard to the process of selecting the technology and the business process nomination. Also, the interviews were planned to understand any issues or concerns about the projects. The EA concept was introduced and the interviewee were asked to provide their outlook of EA implementations at their organizations.

The below table categories the collected data from the sixteen participants:

Category	Organization A	Organization B
Organization size	1000-10000 employees, 10-100 IT members	10000-25000 employees, 10-100 IT members
Organization type	Government-local	Government- federal
Number of interviewee	Three senior executives One IT senior Manager	Three senior executives One IT senior Manager
Existence of business automation projects	Yes	Yes
Existence of EA framework	No	No
Business process projects owner	The IT unit is responsible about managing the projects and they own it. However, the business units participate in the project committees.	The IT unit is responsible about managing the projects and they own it. However, the business units participate in the project committees.
The process to identify the business activities to be automated.	The process is not planned; usually the business users generate a request to the IT head.	The organization is using balance scorecard to evaluate the performance against specific Key Performance Indications (KPI), regular monitoring to the performance is on practice. The areas of improvements communicated with the IT for planning.
Efficiency of the business process automation initiatives	The process is random and not linked to the organization strategy. User satisfaction with the IT facility is very low and there are a lot of issues. The existing solutions dose not matches the business requirements. Moreover, the respond to the business demands usually take long time	The IT strategy and balance scorecard are not linked with the other business units. Delay in responding to the business requirements is affecting the performance. Moreover, there is no shared vision for all the entities under the same organization; as a result, there



	because it is not planned appropriately. The current business processes automation facilities costing the organization a lot of money and there is no business value.	are duplication in the processes, time and cost loose.
IT strategy to acquire business process automation technology	There is no planning for the processes automation, the IT team usually explore the new technology and manage internal Prove Of Concept (POC), the stakeholder contribution found to be very limited and not effective.	There is no planning for the processes automation, the IT team usually explore the new technology and manage internal Prove Of Concept (POC), the stakeholder contribution found to be very limited and not effective.
Efficiency of the technology evaluation process	The current process are not linked to the organization strategy and there is no IT architecture to validate the technology compatibility.	The IT unit evaluates the automation solutions in an ad hoc procedure, the IT environment is very complicated and huge, there is a need for an approach or methodology to manage the planning side.
Business recommendations and enhancements in the process of implementing automation projects	Proper planning for the organization IT requirements. IT unit has to collaborate more often with the business units for process enhancements. Business units have to be engaged in evaluating the automation solutions. Business units have to force the employees to use the technology.	Road map for the business and IT alignment is recommended. More frequent collaboration between the IT and the business units. Create an evaluation methodology for decision-making.
EA implementations	The business and the IT units showed great interest in the EA framework, however, the IT unit would advice to use this	The IT believes that EA framework can mange the planning process and will be of a value to the business strategy.

	framework in more stable organization with clear strategy and less changes. On the other hand the business units advice to push using the framework from the organization board and across all the entities under the organization to obtain the maximum value. But both the IT and the business units realizes the power and authority that are required for EA to be established and maintained inside the organization.	The business units agreed on the EA concept, but the ownership could be an issue, there is an existing internal communication concern, which might affect EA implementation.
--	--	--

Table 7: Interview analyses report organization A and B

Category	Organization C	Organization D
Organization size	1000-10000 employees, 1-10 IT members	1000-10000 employees, 10-100 IT members
Organization type	Government-local	Government-federal
Number of interviewee	Three senior executives One IT senior Manager	Three senior executives One IT senior Manager
Existence of business automation projects	Yes	Yes
Existence of EA framework	The IT unit answered this question with Yes and it is started recently. However the business users did not know about it, so they answered this area with no existence of EA.	No
Business process projects owner	The IT unit is responsible about managing the projects and they own it. However, the business units participate in the project committees.	The IT unit is responsible about managing the projects and they own it. However, the business units participate in the project committees.
The process to identify the business	The initiatives are linked with the organization strategy, KPIs and a	The process is not planned; usually the business users

activities to be automated.	balance scorecard is used.	generate a request to the IT head.
Efficiency of the business process automation initiatives	The strategic projects have no issue, but still, not all the requirements covered in the strategy. The strategy has duplicates in its projects. The projects also conflicts with the IT outsourcing initiative.	The business value for the existing initiatives is not achieved, moreover, the link with other entities under the same organization created different requirements, without a planning process, the outcome from the initiatives will not satisfy all the entities.
IT strategy to acquire business process automation technology	There is reference body that act as technology authority, and advice on the technology to be used.	There is no planning for the process, however, the major initiatives is lead by the organization headquarter and forced to be implemented in its different entities.
Efficiency of the technology evaluation process	The process is not efficient, the existing approach dose not reflect the organization characteristics. The recommended technology to be used has been evaluated by a single authority and against general attributes.	The process is not efficient, the existing approach dose not reflect the organization characteristics. The recommended technology to be used has been evaluated by a single authority and against general attributes.
Business recommendations and enhancements in the process of implementing automation projects	All the business requirements have to be collected in an efficient method. IT outsourcing project has to be aligned with the organization strategy. Internal Technology evaluation needs to be linked to the business requirements.	Proper planning for the organization IT requirement. Internal technology evaluation needs to be linked to the business requirements.
EA implementations	Existing EA implementations started, it shows some resistance	The IT and the business units highly recommends EA, on the

	from the business units especially the operation improvement department because of the common tasks. The buy in from the business units not achieved and requires additional efforts.	other hand they expected internal resistance from other departments because of the shared tasks.
--	---	--

Table 8: Interview analyses report organization C and D

The interviews results have in common many aspects, for example all the respondents showed lack of planning for the IT projects. Such as, some of the organization had outsourcing projects which conflicts with the internal organization strategy. Other organizations complain of not having internal control over the technology selection and they are linked to other entities, which increased the risk of not meeting the internal business needs. Most of the existing efforts to plan the execution of IT projects identified to be unproductive.

### **4.3. EA strengths in supporting BPA projects**

This section will discuss literature review or related work to EA advantages and strength to support the success factors of business processes automation and to mitigate the identified issues in the survey and interviews results.

#### *4.3.1. Evaluating different information systems using EA*

A method of evaluating different scenarios for selection an information system was presented by Gammelgard, Ekstedt and Narman (2010), the method asses the decision makers to select from different scenarios by providing high quality of information and deep investigation. This method consists of three frameworks; functional reference model, non-functional quality attributes and business value dimensions as illustrated in figure 15, Gammelgard, Ekstedt and Narman (2010) have tested and applied the method on a comprehensive case study of large European power company.

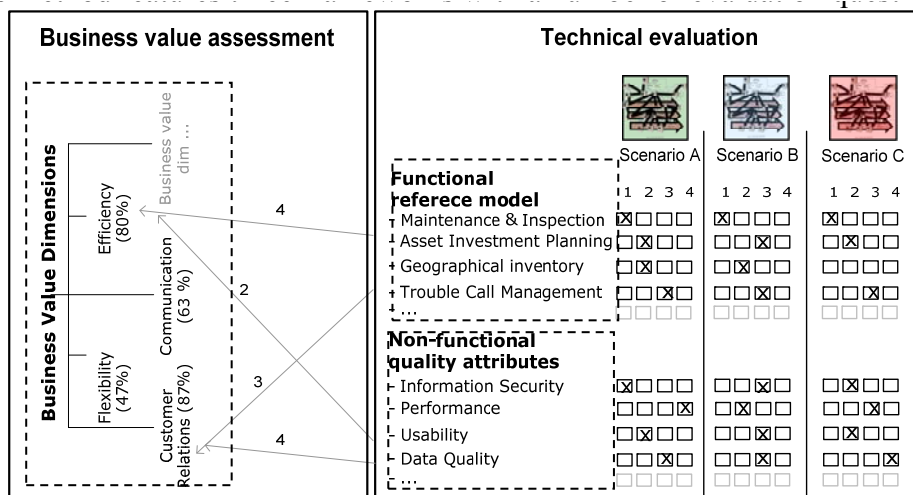


Figure 15: Evaluating information systems (Gammelgard, Ekstedt & Narman 2010, p3)

In the functional model where the most fundamental role resides, which is the function or the services to the business. The challenge was to match the business requirements with the information system functions, and not to be a bias to a vendor product; the Federal Enterprise Architecture (FEA) component was used to develop the functional reference model. In specific, the service component reference model (SRM) was used. It is a business driven model, which supports the reuse of applications, application capabilities and business services. FEA service model domains demonstrated in figure 16 below (OMB 2005).

Service Domains	Service Types
<b>Customer Services</b>	<ul style="list-style-type: none"> <li>• Customer Relationship Management</li> <li>• Customer Preferences</li> <li>• Customer Initiated Assistance</li> </ul>
<b>Process Automation</b>	<ul style="list-style-type: none"> <li>• Tracking and Workflow</li> <li>• Routing and Scheduling</li> </ul>
<b>Business Management Services</b>	<ul style="list-style-type: none"> <li>• Management of Process</li> <li>• Organizational Management</li> <li>• Investment Management</li> <li>• Supply Chain Management</li> </ul>
<b>Digital Asset Services</b>	<ul style="list-style-type: none"> <li>• Content Management</li> <li>• Document Management</li> <li>• Knowledge Management</li> <li>• Records Management</li> </ul>
<b>Business Analytical Services</b>	<ul style="list-style-type: none"> <li>• Analysis and Statistics</li> <li>• Visualization</li> <li>• Knowledge Discovery</li> <li>• Business Intelligence</li> <li>• Reporting</li> </ul>
<b>Back Office Services</b>	<ul style="list-style-type: none"> <li>• Data Management</li> <li>• Human Resources</li> <li>• Financial Management</li> <li>• Asset / Materials Management</li> <li>• Development and Integration</li> <li>• Human Capital / Workforce Management</li> </ul>
<b>Support Services</b>	<ul style="list-style-type: none"> <li>• Security Management</li> <li>• Collaboration</li> <li>• Search</li> <li>• Communication</li> <li>• Systems Management</li> <li>• Forms Management</li> </ul>

Figure 16: Service component reference model (OMB 2005, p19)

#### 4.3.2. Calculating service quality of existing information system using EA

In another published paper, a model for evaluating service quality of a system was tested based on the enterprise architecture. Raderius, Narman and Ekstedt (2009) presented how extended influence diagrams (EID) can be combined with enterprise architecture meta-model to address the uncertainty in the architecture analysis. That was under the case of lack of documentation and data availability. In the used case study, a data warehouse for a Swedish company was examined to decide for future changes in information structure. The model objective is to increase the system availability and to allow reasoning about the various scenarios with various modifications of variables. To support the architecture analyses, the necessary information was captured in the EID, as illustrated in the figure 17 below.

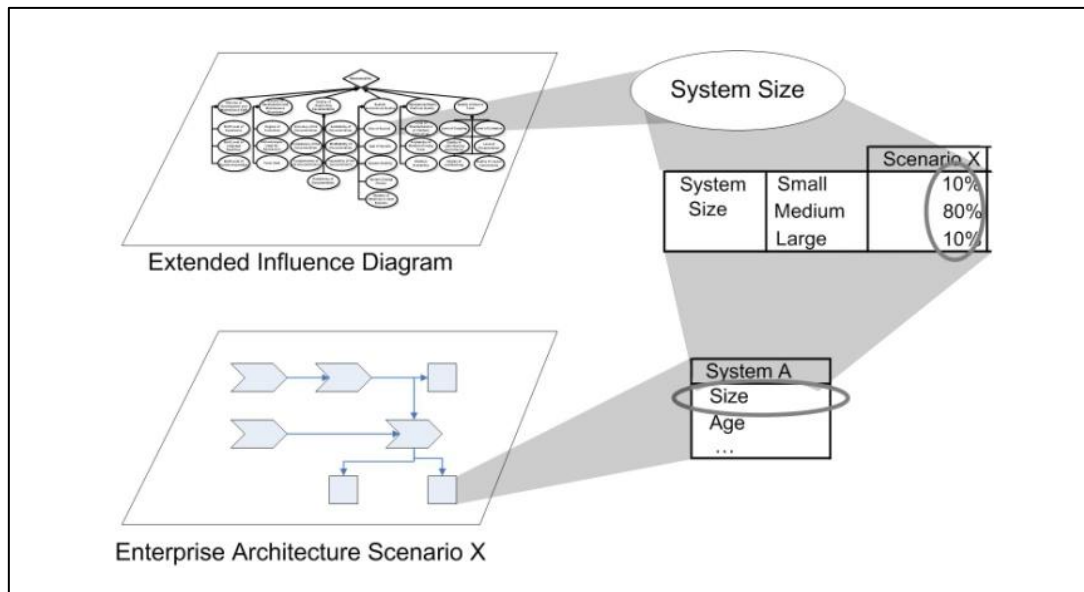


Figure 17: Extended influence diagrams (EID) (Raderius, Narman & Ekstedt 2009, p3)

To analyze the availability of the data warehouse, data was collected from the system and the organization using documentation, logged statistics and interviews. Figure 18 below shows the result of the assessment; there are areas for improvement for the organization to decide about. The model supports the decision makers in the IT area to form better understanding to the existing environment and build a to-be situation.

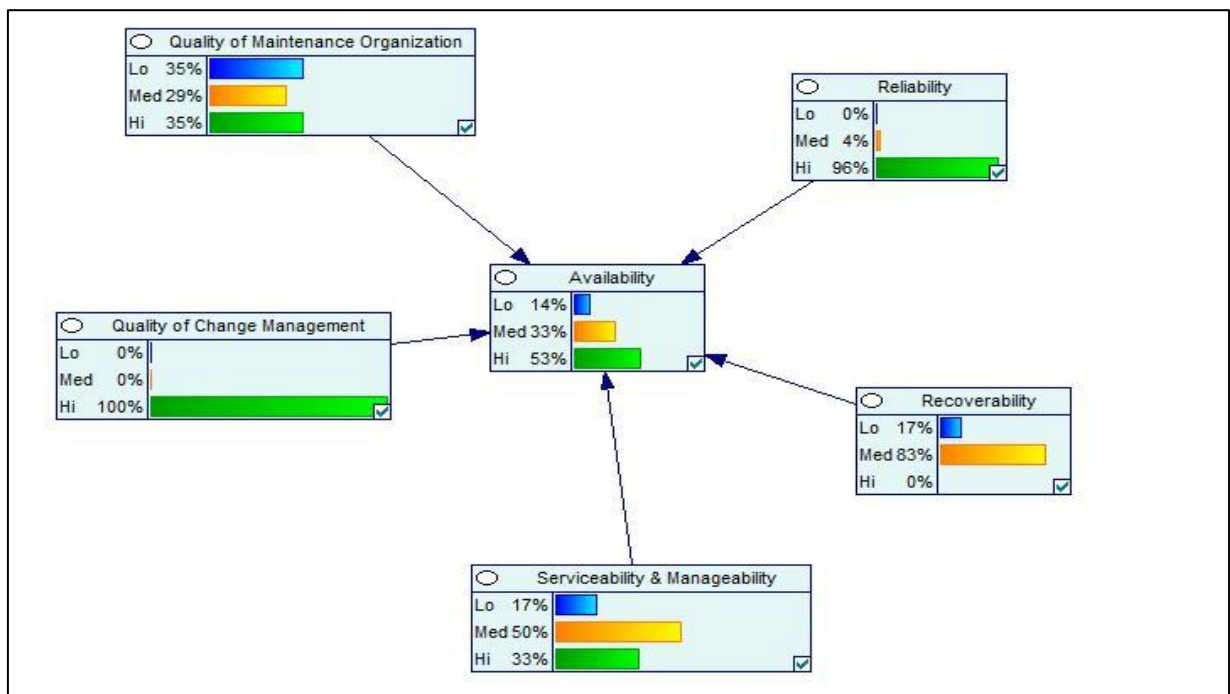


Figure 18: Results assessment (Raderius, Narman & Ekstedt 2009, p10)

#### 4.3.3. Managing IT portfolio using EA

IT projects are generally driven by the business, one of the main objectives for the enterprise architecture framework is to guide the project portfolio in the organizations, through out its layers, EA can link the project objective to the business and provide analysis with justification for initiating the project. It is an effective tool to align the projects with the business strategy. Figure 19 below shows how the technology and the strategy can impact the business and the IT, and in figure 20, the EA role is illustrated, in how it can connect the strategy with the IT projects development in order to align the business with the IT.

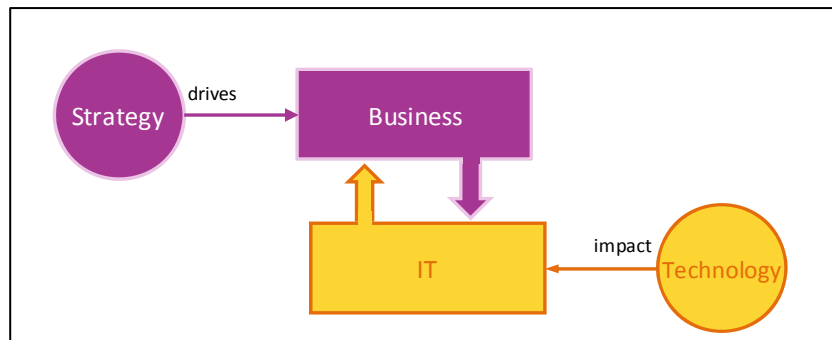


Figure 19: Strategy and technology creates a gap between business and the IT (Celik 2009, p2)

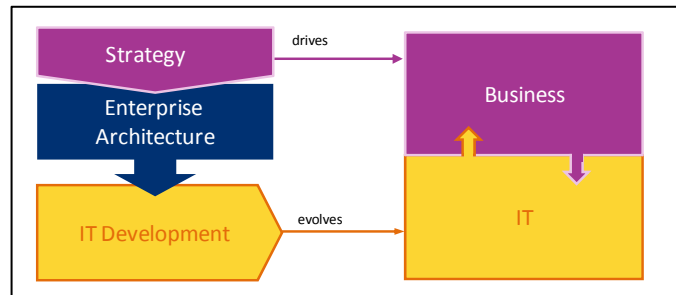


Figure 20: Objective of EA (Celik 2009, p2)

Celik (2009) introduced a concept that describes the interaction between business development projects and the enterprise architecture. The case study of Celik (2009) was in the IT area of research and development for a major company in manufacturing heavy trucks, the company called Scania. At Scania's IT area, which comes under the research and development department, an EA program, has been started to describe the current status for the organization architecture and the target architecture. The migration between the two statuses is governed by the business development projects in order to match the organization's strategy (Celik 2009). The concept of Scania's EA is shown below in figure 21:



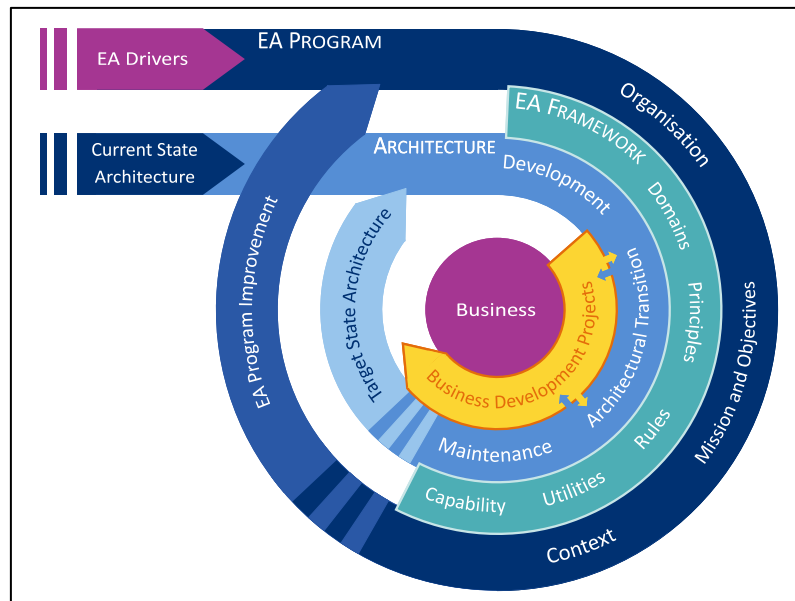


Figure 21: Scania IT area R&D's concept for EA (Celik 2009,p4)

Celik (2009) introduced the different processes of IT project management, which are portfolio management, project management process and software development process. Figure 22 below shows the different phases and process at Scania for the selection and prioritization of the business development projects. In Celik (2009) the case study covered the first two phases which are initiation and pre-study.

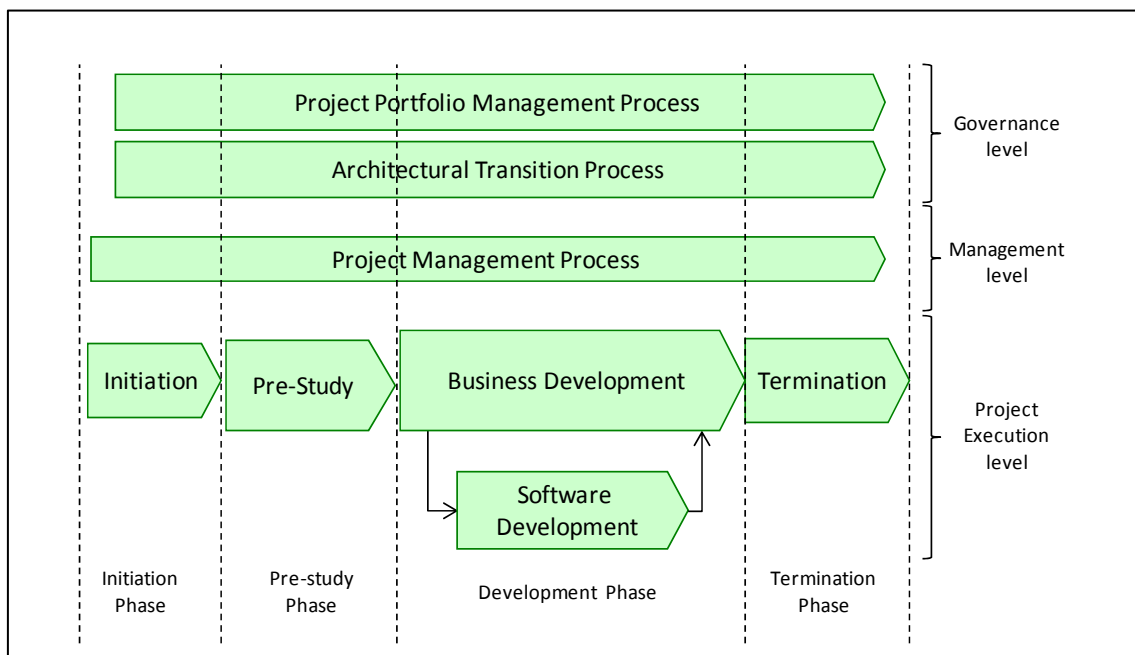


Figure 22: IT projects phases (Celik 2009, p26)

Summarizing the concept of architectural transition, first it starts with identifying the important elements in the strategy that will impact the IT area of research and development, these strategies will form a base for developing EA requirements, which the business development project will comply with, as a next step the EA will trigger a process to produce number of deliverables for the architectural models. These models will facilitate understanding the different informational and organizational aspects in order to support the decisions. EA requirements will address: considering enterprise-wide perspective, understanding “As-Is” environment, describing “To-Be” state landscape and business operational anchoring (Celik 2009).

After the deliverables of the pre-study are reviewed and the architectural recommendations finalized, the IT management portfolio make a decision to cancel, undertake further work or approve the project and start the next phase.

Below a summary diagram showing how is the interaction between the architectural transition domain and the project domain, and its linked the first two phases of IT project management process, which are initiation and pre-study phases.

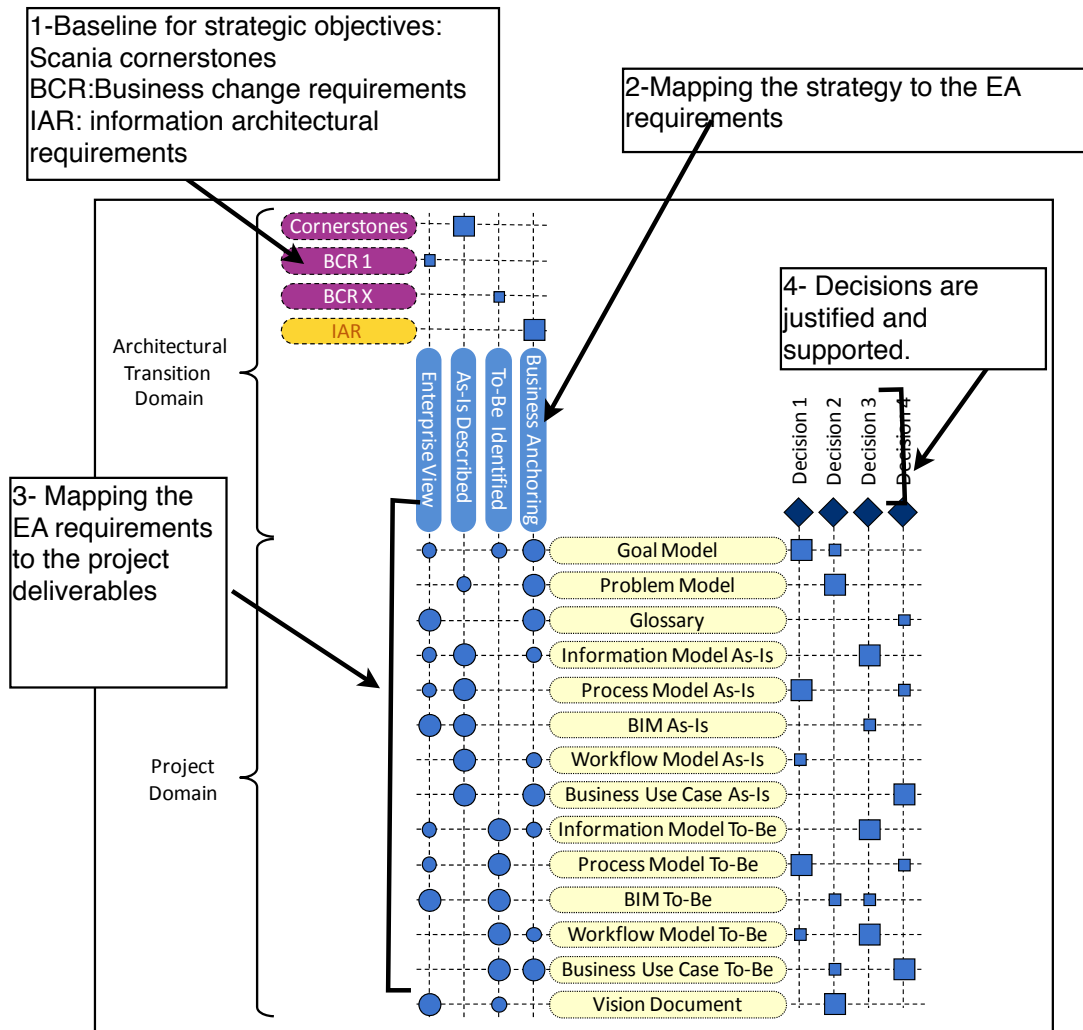


Figure 23: Celik (2009)

#### 4.3.4. Application consolidation using EA

Franke and Johnson (2009) pointed out a method of using the enterprise architecture in application consolidation. In enterprise organizations with massive number of services and operations that depends on IT solutions, complexity issue could arise within the IT environment, therefore, EA have contributed heavily to simplify the complexity. Franke and Johnson (2009) have used a combination of the Ministry of Defense Architecture Framework (MODAF) and Probabilistic Relational Models (PRM) with ISO/IEC 9126 standard to implement a cost-benefit analysis. This analysis is used to generate recommendations for application consolidation initiatives. This method considered practical for Franke and Johnson (2009) among other methods they have looked at. The

method was introduced as three phases, the first phase presents the decision-making theory (Franke & Johnson 2009), and it is based on calculating the application cost and utility. The cost consists of two components the capital expenditures for application procurement or development, and the operation expenditure for maintaining application operation. Figure 22 below shows the different application decisions:

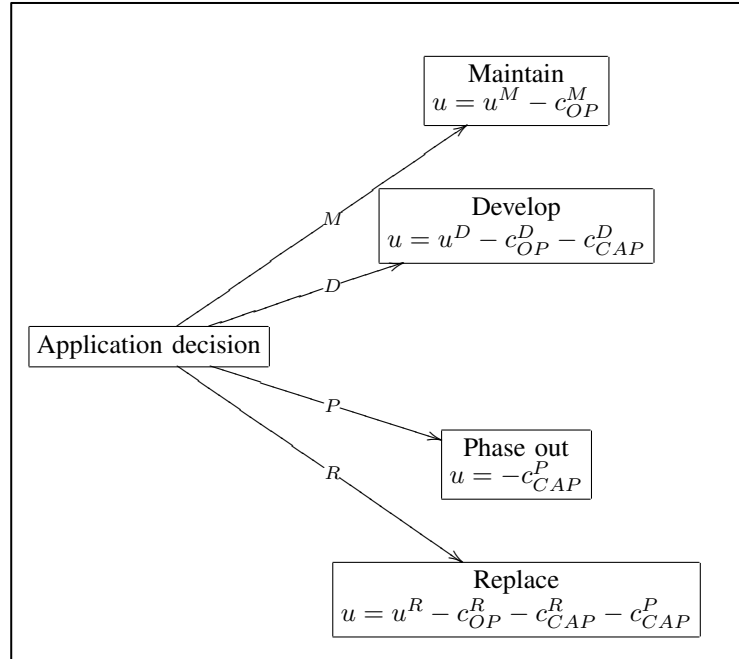


Figure 24-A: Application decisions (Franke and Johnson 2009, p2)

Referring to the main purpose of this method, which is utilizing the applications, the application utility referred to the delivered utility by the application minus the application cost (Franke & Johnson 2009). The below figure shows the different decision with the calculation of its related utility and cost:

	Utility	Costs	
		OPEX	CAPEX
Maintain	$u^M$	$c_{OP}^M$	
Develop	$u^D$	$c_{OP}^D$	$c_{CAP}^D$
Phase out			$c_{CAP}^P$
Replace	$u^R$	$c_{OP}^R$	$c_{CAP}^R$

$$\operatorname{argmax}_{\{M,D,P,R\}} \left\{ \begin{array}{l} \hat{u}_i(M) = \hat{u}^M - \hat{c}_{OP}^M \\ \hat{u}_i(D) = \hat{u}^D - \hat{c}_{OP}^D - \hat{c}_{CAP}^D \\ \hat{u}_i(P) = -\hat{c}_{CAP}^P \\ \hat{u}_i(R) = \hat{u}^R - \hat{c}_{OP}^R - \hat{c}_{CAP}^R - \hat{c}_{CAP}^P \end{array} \right\}$$

Figure 24-B: Decisions and the calculation of the related utilities (Franke and Johnson 2009, p3)

In the method second phase, the utilities and cost estimation problem has been addressed. The last phase was to manage the problem of complexity within applications environment, Franke & Johnson (2009) used probabilistic relational models with MODAF, to pack the estimate of the cost and utility in a logical way with attributes assigned to each entity of the meta-model (Franke & Johnson 2009).

Figure 25 below shows the MODAF architecture:

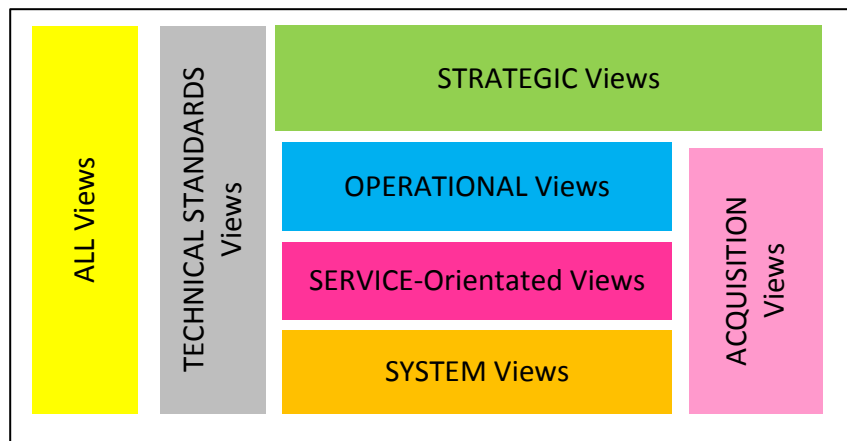


Figure 25: MODAF architecture (Franke & Johnson 2009, p6)

By using MODAF Meta Model (M3), two elements will be enabled for the cost analysis method: Taxonomy and Mapping, Taxonomy will describe the set of process, activities, products and others in order to support accurate cost estimation (Franke & Johnson 2009). Mapping will ensure mapping every thing to the taxonomy; it is a critical process as many complex relations have been generated. This meta-model will illustrate the different relations to be used in the decision-support model. The below figure 26 presents the meta-model in its qualitative dependency structure, having the application element in the center (Franke & Johnson 2009).

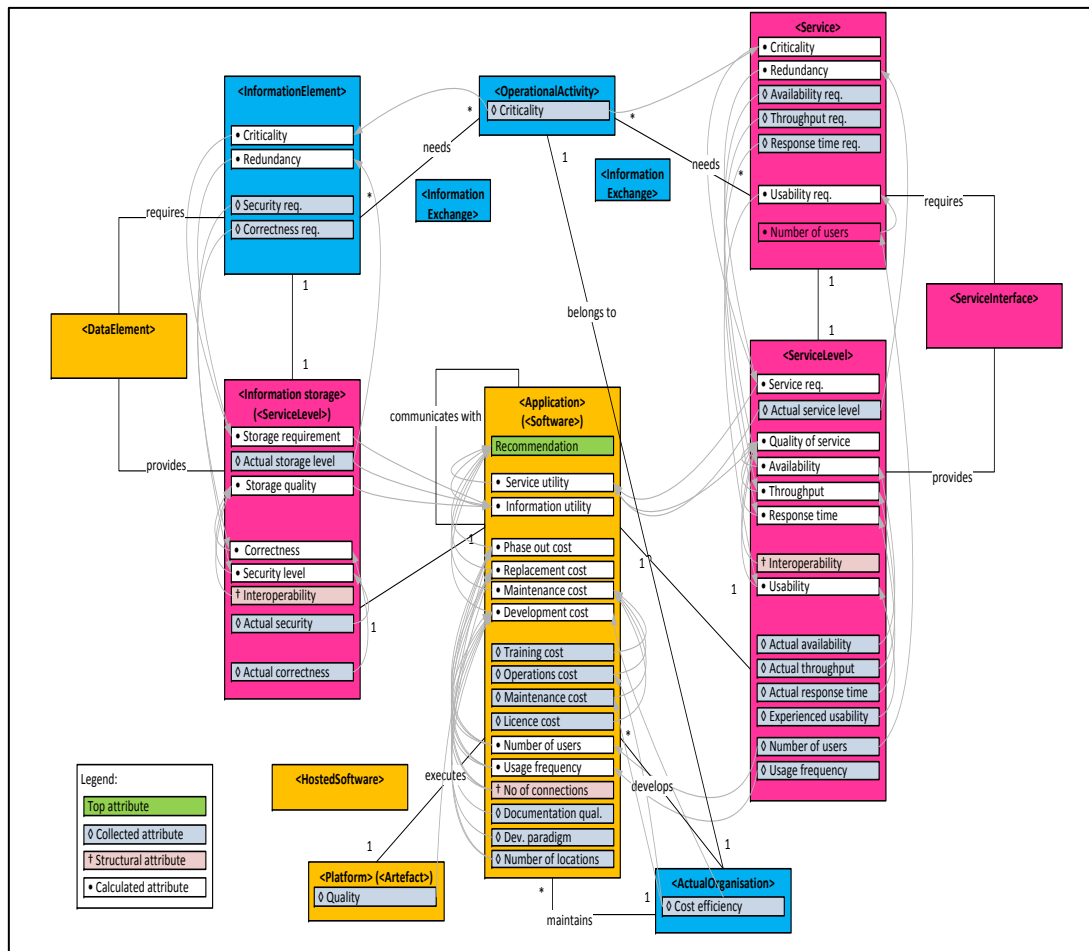


Figure 26: Meta model (Franke & Johnson 2009, p8)

By using Bayesian network tool GeNIe to illustrate the use of the method for scenario-based decision making (Franke & Johnson 2009), the below diagram was generated (Figure 27):

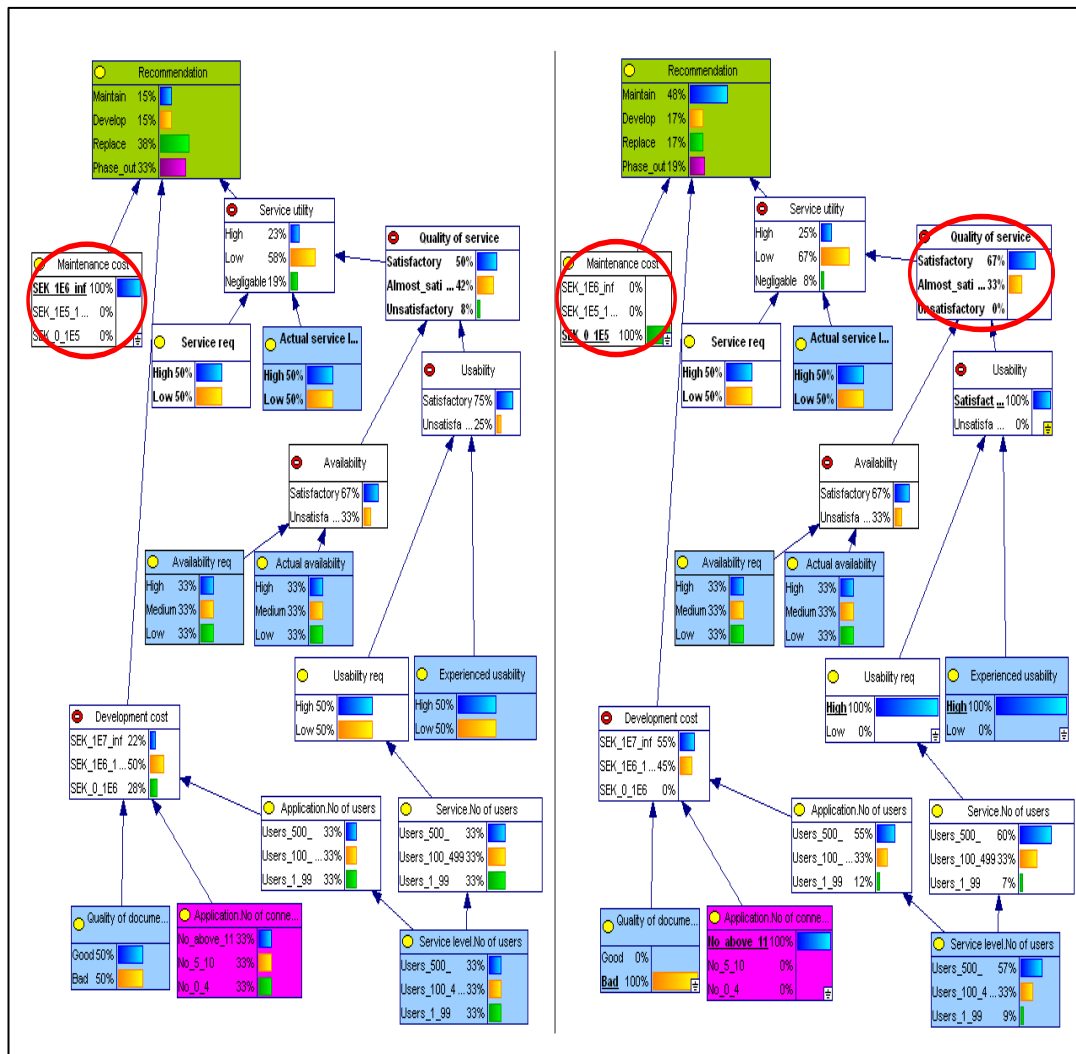


Figure 27: Bayesian network tool GeNIe to illustrate the use of the method for scenario-based decision making (Franke & Johnson 2009, p9)

The two scenarios in the above diagram recommend different approaches, having that said, this framework “allows for uncertainty in the recommendations, and transparently enables traceability of where the decisions come from”(Franke & Johnson 2009, p 9).

#### 4.3.5. IT strategy alignment with business strategy using EA

Saat et al (2010) have proposed an approach to use an EA model in supporting IT and business alignment, Saat et al (2010) claims that the other approaches are not suitable for different types of alignments, typical situation, so Saat approach is used with four different status of IT and business alignment.

From EA different definitions, supporting the business is its main element, “EA can be seen as a tool for achieving alignment between business and IT” (Saat et al. 2010, p2). The different types of EA frameworks are aligned with the model-base. At the central of

EA the architectural descriptions resides, such as the strategic aspects, organizational structure, business process, software, data and IT infrastructure. Saat et al. (2010) discuss the approach of connecting the Zachman EA framework with Luftman's strategic alignment approach. Luftman's measures, can measure the alignment maturing covering the areas of (communication, competence/value, governance, partnership, technology scope and skills maturing). Saat et al. (2010) claims that this model cannot guide the work with the information systems, its more focused on the strategic alignment (Saat et al., 2010). In Saat et al. (2010) approach, the focus more on "understanding how the information systems and their properties can be introduced when managing and analyzing alignment"(Saat et al. 2010,p1). Saat et al. (2010) selected three quality parameters: IT system qualities which are based on the ISO 9126 standard, business qualities which are based on a taxonomy presented in previous research of Gammelgård (2007) in Saat et al. 2010), Gammelgård, Ekstedt and Gustafsson (2006 in Saat et al. 2010), Gustafsson, Franke, Höök and Johnson (2008 in Saat et al. 2010), and IT governance qualities that are based on the Control Objectives for Information and related Technology (COBIT) standard. The IT the qualities are described in the below figure:

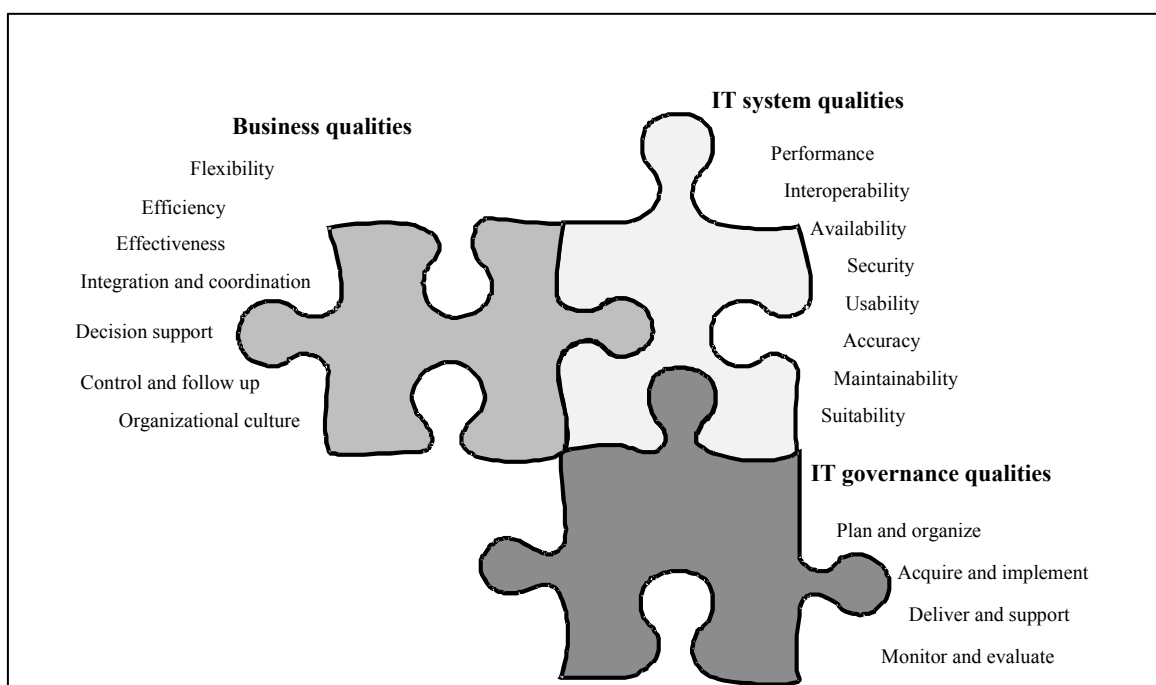


Figure 28: Conceptual view of an IT/Business alignment operationalization  
(Saat et al. 2010, p4).



The objective in Saat et al. (2010) study is to create EA model that can work with the different situations of organization IT/Business alignment. Saat et al. (2010) used a survey to collect the required data, the survey included four parts, first part was background information, second part contained two sections addressed the EA use for IT/business alignment and IT/business alignment and the IT department positing in the respondent's company (Saat et al. 2010). Third part addressed the qualities of the IT, business and IT governance, for each quality the respondents were asked to "mark the actual (as-is) situation (degree of realization) and desired (to-be) situation (importance for future realization) on a five-point Likert scale" (Saat et al. 2010, p5). Fourth part was about how confident the respondent with his answers (Saat et al. 2010).

Based on the survey data analysis, Saat et al. (2010) introduced four different as-is situations:

- A: technical quality biased
- B: business demand biased
- C: aligned innovation biased
- D: compliance biased

Details of the analysis and situations description can be found in Saat et al. (2010) study. The top qualities generated from the four as-is situations qualities listed in the below table, these qualities were prioritized high by the four as-is situations in their to-be situation (Saat et al. 2010):

Top qualities for all four as-is situations	
IT system	Interoperability
	Availability
	Security
	Usability
	Accuracy
Business	Efficiency
	Effectiveness
Table 9: Four clusters prioritized the following qualities high or very high in their to-be situations (Saat et al. 2010, p10).	

Based on the generated qualities and its situation a core model has been created, an add-on meta model about each situation created and added to the core meta model (Saat et al. 2010).

The below figure shows the core model includes the attributes of the table above, additional attributes has been added as it have a relation to the selected seven qualities (Saat et al. 2010). In the figure 29 below, an availability attributed for an application is pointed out with its casual relationship.

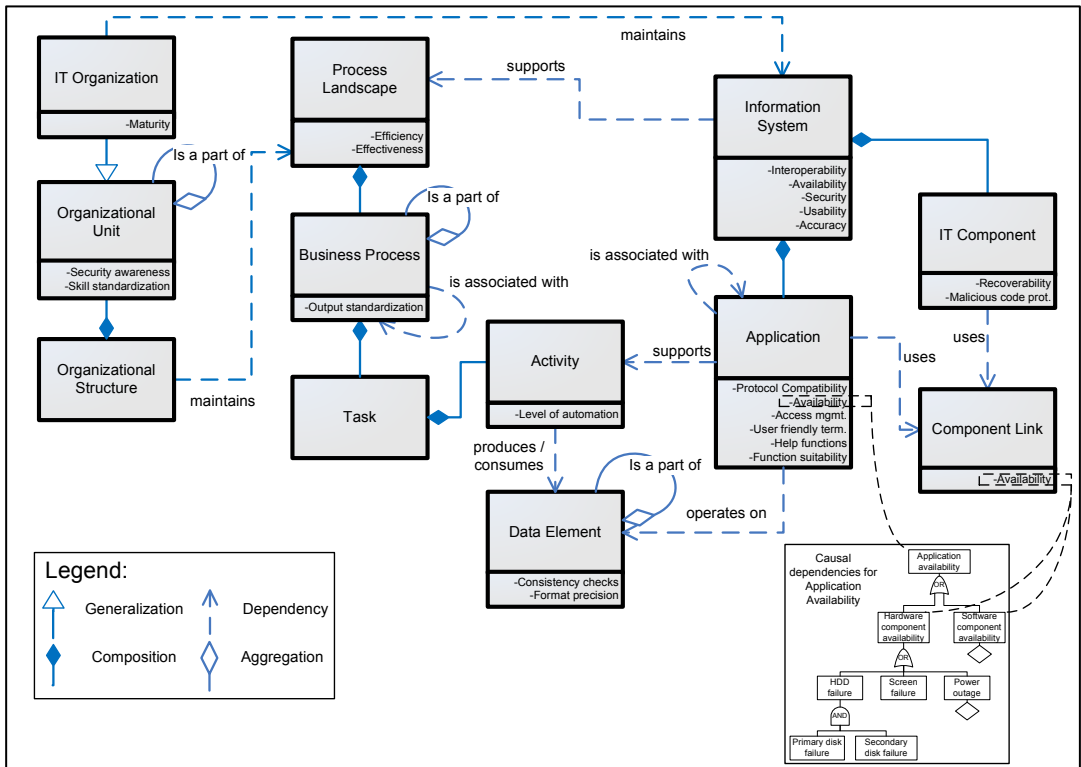


Figure 29: The core meta-model (Saat et al. 2010, p7)

On the other hand, meta-model add-ons meta model for the situation A has been created and presented in figure 30 below:

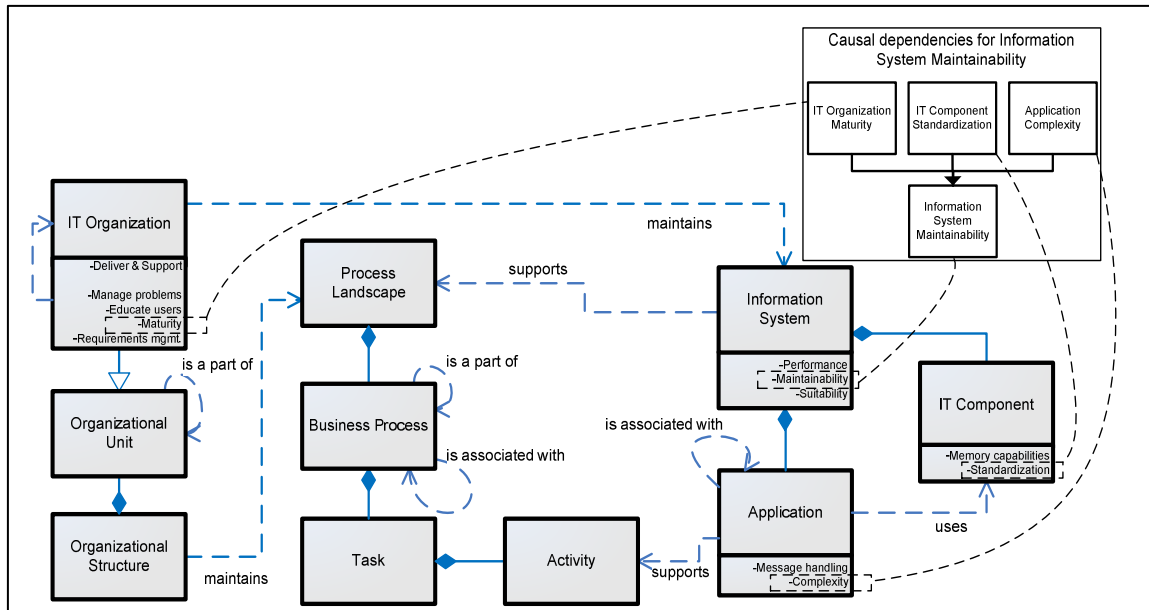


Figure 30: Meta model fragment for as-is situation A on its prioritized qualities  
(Saat et al. 2010, p7)

An example of what attributes of situation A can affect the information system maintainability is illustrated in the same figure, showing attributes of IT organization maturity, IT component standardization, and application complexity. the relation showed another attributes that can affects the information system maintainability (Saat et al. 2010)

Saat et al. (2010) study shows that EA can assist the effort for IT/Business alignments considering tangible qualities for IT systems, business and IT governance by giving and identified situation, as most of the organizations has different challenges in achieving the degree of IT/business alignment (Saat et al. 2010).

#### 4.4. Answering the research questions

This section will identify and match the results from the survey, interviews ad literature review to the research questions. All the questions will be answered followed by a summary of the findings.

RQ1-A: What are the issues and risks encountered during the implementation of business processes automation projects?

First an initial list of risks have been identified through related work from literature review, the issues and risk listed below:

1. IT and business do not know how to move from current status (as-is) to the future status (to-be), as the IT/business alignment not in practice
2. Selecting and evaluating the compatible technology for the business requirements is not efficient
3. Lack of organization support
4. ROI is not achieved
5. Redundancy in applications output, and lack of quality control
6. Integration difficulties between the different systems to deliver efficient business process services
7. Evaluating the IT systems if it cover the business requirement
8. Dynamic changes to the business processes
9. Business processes needs improvement prior to automation project .

Next step, the generated issues was added to a survey and sent to different government organizations to examine if there is an agreement of issues existence with the business processes projects, also to register any other issues outside the default list.

The survey output showed issues but the agreement with each statement varied, the concern was mostly on the business requirements identification and not technology issues.

*RQ1-B: What is the root causes for the issues collected from RQ1-A?*

The literature review generated list of root causes mentioned below:

1. Business requirements and needs are not clear a cross the organization
2. Lack of communication between IT and business units
3. Stakeholders are not involved in the projects
4. Lack of support from the organization to the project
5. Organizations processes needs improvement
6. Dynamic changes to the business environment

7. For the business process automation there are redundant systems supports the same business and produce the same outcome.
8. The technology used in the business process automation is not compatible with the business requirements.
9. The technology used in the business process automation is not compatible with the existing technology environment.
10. Existing technology for business process automation have difficulties to integrate or connect with others.

The above list was added to a survey and distributed to examine the validity of these causes in the government organizations; most of the statements have been identified as a root cause to issues related to the business process automation projects.

*RQ1-C: What success factors can be obtained based on the result of RQ1-B?*

Following the same method of RQ1-A and RQ1-B, list of success factors have been obtained through the literature review and tested by the survey, the survey results indicated a very high agreement on the factors listed below:

1. Monitor and track performance of business processes with its IT services
2. Requires clear and documented business requirements
3. Using a measured mechanism and tool for decision support
4. Strategy alignment between IT/business
5. Stakeholder's involvement in the project to support decisions.
6. Enhance the evaluation of new technology or systems in regard to the business value and avoid redundancy
7. Existing technology needs continues assessment against business requirements and changes
8. Business process re-engineering where applicable

*RQ2-A: How dose the technology solution selected to be used for the information systems?*

By conduction interview at four government organizations with sixteen different decision makers and senior IT managers, it was found that no process in place for guiding the technology selection to achieve effective business automation, or on other organizations, this process is conducted away from them in another body belongs to the

same authority or the organization head quarter, which contradict with their internal business requirements. All the interviews agreed that this process is necessary and the existing approach has to be improved.

*RQ2-B: How is the processes to be automated are selected?*

The interviews results showed that there is no process exists in place, but a adopting balance scorecards and KPIs approach is used to guide the automation initiatives, in addition, all the interviewee had a common issue on this regard, which was the missing link between the IT strategy and the business strategy, they all agreed that a methodology has to be implemented to guide the business processes automation inside the same organization or between its different entities to achieve efficiency.

*RQ2-C: Is there any hindering reasons for not implementing enterprise architecture?*

The main objective from this question was to draw future recommendations regarding EA implementations, however the answer to this question will not lead to answer this research main question.

A collected data through the interviews dialogue, helped answering this question, bellow list of identified hindering reasons against EA implementation:

1. The existence of other authorities or internal departments with similar function might contradict or show resistance
2. Awareness sessions are very important to buy in the program internally and gain the departments cooperation, as existing communication problems could affect the implementation
3. Most of the responses think that EA implementations will need a power of position and authority to operates and maintain its objectives.

By answering the above sub-questions, it is proved that there is issues with the business processes automation projects, the next phase to explore literature review for possible EA solutions to resolve the generated issues and supports the success factors of business process automation projects.

Going through the literature review in section 4.5, it was found that many studies and approaches were using the EA to address related issues generated from answering sub-questions (RQ1-A,RQ1-B,RQ1-C,RQ2-A,RQ2-B). Also using the results from the interviews, all the interviewees agreed that EA would assist the business process implementations in a positive line. This conclude to prove this research hypothesis:

*H1: The EA framework implementations supports the success of BPA project*

Proving H1 answered the research main question:

*“How dose implementing enterprise architecture framework affects the business processes automation initiatives?”*

#### **4.5. Summary:**

All the research sub-questions were answered, which showed the existence of an issues with the business processes automation initiatives, moreover, using the literature review showed that EA would assist in avoiding the issues and risk attached with the business processes automation, EA could be additional success factor to the business processes automation initiatives.

## **5. Conclusion and recommendations**

### **5.1. Conclusion**

The aim of this research is to examine the necessity of implementing enterprise architecture framework in the organizations to achieve agility in its business processes. The main findings of this research were identifying nonproductive planning process across the government organizations, that results in a dissatisfaction of the business process automation initiatives. Also the government is spending effort and money to support these initiatives, but the business value is not measured. The research showed an opportunity of using enterprise architecture framework to address the issues that results or combines with the business process automation projects. On the other hand, this research revealed the great support from the local and federal government towards the automation initiatives, which should be appreciated; also, efforts should continue to assist the government in achieving its vision.

### **5.2. Limitations**

Although the research questions were answered, some results from the survey could not be confirmed. This is due to the small gap or disagreement between the answers. A greater sample could resolve this matter; also another style of answers could be used to obtain convinced results. Interviews were not long enough to get sophisticated details, however, there were a lot of similarities in the collected data, which indicates a good quality of information and consistency.

Also, it has to be mentioned that the interviews covered UAE capital city Abu Dhabi, other areas like Dubai and Sharjah could not be reached due to the time constraint.

### **5.3. Recommendations and further work**

An interesting finding in this research was the issue of the different entities that belongs to the same organization but it differs in the business. These entities are facing great challenge to comply with the organization standards and its internal business standards. This could be taking further for future study to implement a common EA framework




that could work for such organizations.

Another observation obtained from the results, was the concept of Return Of Investment (ROI). Although it was found during the interview that Abu Dhabi government is spending on the business processes automation projects, the government and the research field might be interesting in getting statistics showing the return of investment. EA framework could support this approach.

A final observation during the interviews was the subject of knowledge management initiatives, to stay focus on the research objectives, this discussion could not be registered, however, three of the four organizations that were included in the interview process, started knowledge management initiative. The government supports the initiative and a road map for wider implementation is under process. As seen from the literature review, one of the EA framework aspects is its ability to generate information from the stored data in its repositories, using different tools and algorithms in order to support the decision-making. EA framework combination with knowledge management projects could be a topic for future research to support Abu Dhabi government initiatives.

## 6. Appendix A: Survey questions

<div><p>Select language you would like to take the survey in الرجاء اختيار اللغة التي تود ان يكون بها الاستبيان</p><p>English</p><p>Next</p></div>
<div><div></div><div><a href="#">Exit Survey »</a></div></div> <div><div><div></div><div>3%</div></div><p><b>Effectiveness of Enterprise Architecture frameworks in implementing business process automation projects</b></p><hr/><p>You are invited to participate (voluntary) in a master research survey about the effectiveness of enterprise architecture frameworks in implementing business process automation projects at Abudhabi government organizations.</p><p>The importance of the Enterprise architecture framework can be as follows:</p><ul style="list-style-type: none"><li>Supports outsourcing</li><li>Helpful in mergers</li><li>Delivers road maps for change</li><li>Support business and IT budget prioritization</li><li>Manages the IT portfolio</li><li>Support systems development</li><li>Delivers insight and overview of business and IT</li><li>Managing complexity</li><li>Supports decisions making</li></ul><p>Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate.</p><p>Please start with the survey now by clicking on the Continue button below.</p></div>

Questions marked with a \* are required

23%

## Effectiveness of Enterprise Architecture frameworks in implementing business process automation projects

### General Information

Contact Information (To be contacted for interview-optional)

First Name :

Last Name :

Phone :

Email Address :

Q5:What is the category of your organization? \*

Q6:What departement you are working in? \*

- ☐ IT  
☒ Business(not IT)

Q7:How many persons working at your organization? \*

Q8:How many persons working at your IT department? \*

Questions marked with a \* are required

30%

## Effectiveness of Enterprise Architecture frameworks in implementing business process automation projects

Q9:Did your organization Implemented application or information system used to automate your business process? \*

- ☒ Yes  
☐ No

Next

**Q10:What applications are you using at your organization,Select from below: \***

- ☐ Enterprise resources planning (ERP for HR,Finance, Payroll, Procurement)
- ☐ Customer Relation management (CRM)
- ☐ On line self services
- ☐ Enterprise content management or Document management system
- ☐ Scanning and archiving system
- ☐ Workflow management system or electronic business process workflow
- ☐ Other applications that automate one or more of your core business activities

**Q11:Are you satisfied with the performance and outcome from the applications you selected in the previous question? \***

- ☐ Very Dissatisfied
- ☐ Not Satisfied, a lot of issues
- ☐ Satisfied, few issues
- ☐ Very Satisfied

**Q:12 Describing your organization, what do you think for the below statements:**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IT projects rarely fail to deliver the business value *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The IT strategic initiatives are linked with the organization strategy *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The decisions to obtain new IT solutions are justified and supported by business value *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IT projects achieved the expected return of investment (ROI) *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Users are satisfied with the quality of services provided through the business process automation *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is a clear road-map between IT and business to transition between current situation of business process automation(as-is) to future(to-be) situation *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The business processes of your organization are clear and well defined *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The business processes of your organization are maintained and updated periodically *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The performance of business processes at your organization are measured periodically for improvement chances *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q:13 Describing your organization, what do you think for the below statements as root cause for the business process automation issues:**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Business requirements and needs are not clear a cross the organization *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of communication between IT and business units *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stack-holders are not involved in the projects *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of support from the organization to the project *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organizations processes needs improvement *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dynamic changes to the business environment *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For the business process automation there are redundant systems supports the same business and produce the same outcome *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The technology used in the business process automation is not compatible with the business requirements *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The technology used in the business process automation is not compatible with the existing technology environment *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Existing technology for business process automation have difficulties to integrate or connect with others *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q13-b: What other root causes for the issues you are facing in the business process automation projects?**

**Q14:What do you think of the below statements as success factors for business process automation projects:**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Strategy alignment between IT/business *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requires clear and documented business requirements *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business process re-engineering where applicable *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stakeholders involvement in the project to support decisions *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using a measured mechanism and tool for decision support *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitor and track performance of business processes with its IT services *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhance the evaluation of new technology or systems in regard to the business value and avoid redundancy *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Existing technology needs continues assessment against business requirements and changes *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q14-b:What other success factors can be obtained for implementing business process automation projects?**

Next

**Dose your organization have implemented Enterprise architecture framework? like TOGAF, Zachman or else!**

- ☐ Yes  
☒ No  
☐ I dont know what is enterprise architecture framework

**Q15:Why is EA important for your organization? \***

- ☐ Supports outsourcing
- ☐ Helpful in mergers
- ☐ Delivers road maps for change
- ☒ Support business and IT budget prioritization
- ☒ Manages the IT portfolio
- ☐ Support systems development
- ☒ Delivers insight and overview of business and IT
- ☒ Managing complexity
- ☒ Supports decisions making
- ☐ Other(Please specify):

**Q16:For what kind of issues do you plan and EA program: \***

- ☐ ERP
- ☐ Business change
- ☒ Legacy transformation
- ☒ Infrastructure renewal
- ☐ Mergers/Acquisition
- ☒ Application renewal
- ☒ Transformation road map
- ☒ Business – IT alignment

**Q17:Dose your organization familiar with the importance of EA? \***

- ☒ Yes
- ☐ No

**Q18:Is your EA part of your organizations strategic governance? \***

- ☒ Yes
- ☐ No

**Q19:Are there any laws or regulations related to EA enforced by the government? \***

- ☒ Yes
- ☐ No

**Q20:what kind of architectures are established in your organization? \***

- ☐ Software
- ☐ Governance
- ☐ Security
- ☐ Technology infrastructure
- ☐ Information systems
- ☐ Business
- ☒ Enterprise architecture

Q21:At which level is enterprise architecture part of your organization governance structure? \*

- ☒ IT management
- ☐ Middle management
- ☐ Top management
- ☐ Management board
- ☐ Other (please specify)

Q22:what kind of EA frameworks dose your organization use: \*

- ☐ Zachman
- ☐ FEAF
- ☐ TOGAF
- ☐ IAF
- ☐ USA DoD
- ☐ ISO/IEC 14252(IEEE std 1003.0)
- ☐ TAFIM
- ☐ TEAF
- ☐ E2AF
- ☐ Organization own
- ☒ Blinded from more than one of the above frameworks
- ☐ Other

Q23:what kid of EA tools is your organization using? \*

- ☐ Aris
- ☐ MS office tools(word,excel,power point)
- ☐ Teleogic
- ☐ Ptech
- ☐ Casewise modeler
- ☐ Troux'Metis'
- ☒ MEGA
- ☐ Other

شكرا لاهتمامكم وتعاونكم الرجاء ارسال الاستبيان لمن يمكنه الاسهام فيه من موظفي الدوائر الحكومية  
Thank you for your contribution, please send this survey to those who can participate from other government organizations

[Thank You for completing this survey. click here to visit the British University in Dubai website.](#)

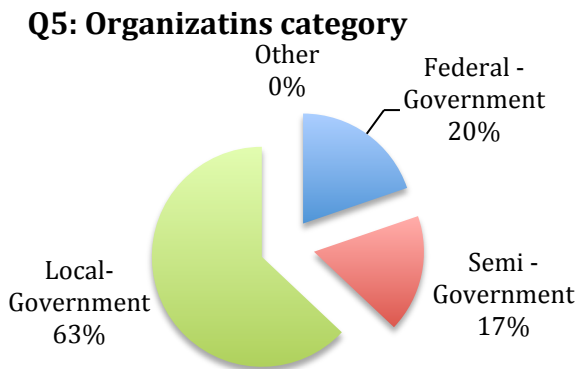
SHARE THIS SURVEY:





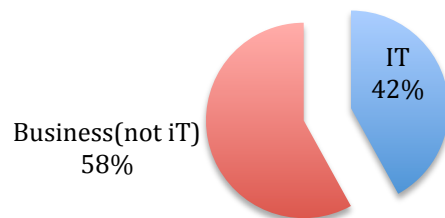
# 7. Appendix B: Survey data analysis report

Q5: What is the category of your organization?	
Federal - Government	19.75%
Semi - Government	17.28%
Local- Government	62.96%
Other	0.00%
Count	81

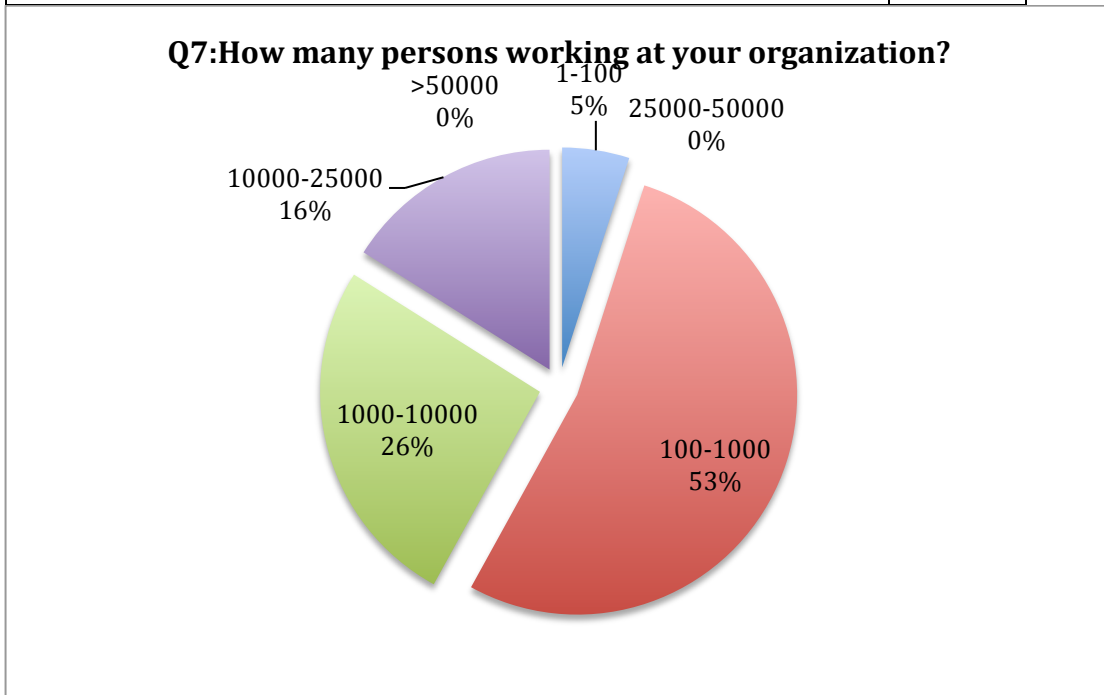


Q6: What department you are working in?	
IT	41.98%
Business (not iT)	58.02%
Count	81

**Q6:What departement you are working in?**

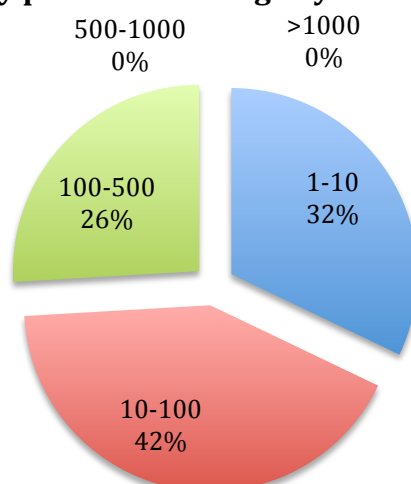


Q7: How many persons are working at your organization?	
1-100	4.94%
100-1000	53.09%
1000-10000	25.93%
10000-25000	16.05%
25000-50000	0.00%
>50000	0.00%
Count	81



Q8: How many persons are working at your IT department?	
1-10	32.10%
10-100	41.98%
100-500	25.93%
500-1000	0.00%
>1000	0.00%
Count	81

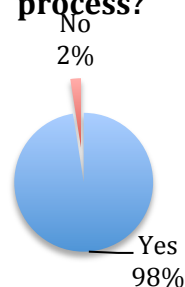
**Q8:How many persons working at your IT department?**



Q9: Did your organization Implemented application or information system used to automate your business process?

Yes	97.53%
No	2.47%
Count	81

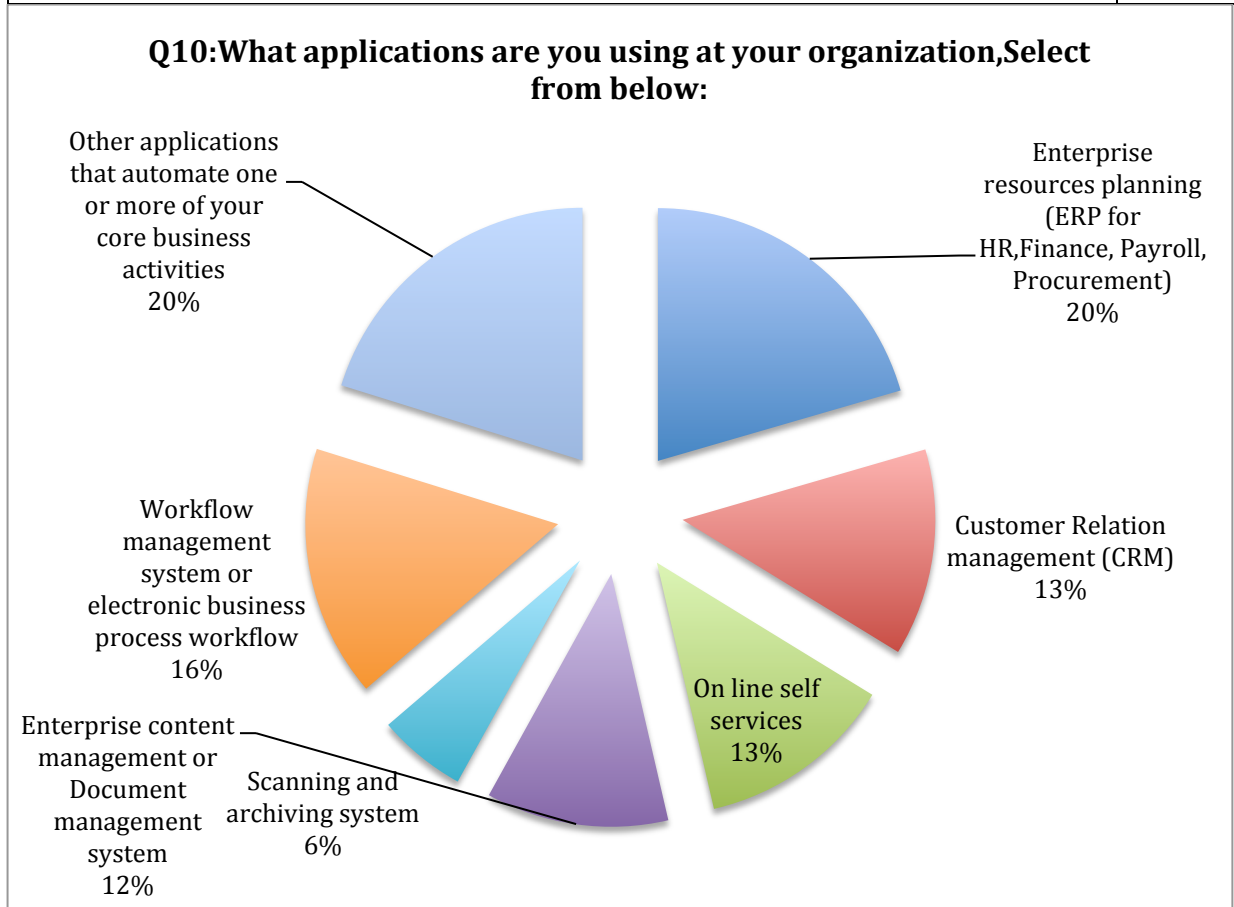
**Q9:Did your organization Implemented application or information system used to automate your business process?**



Q10: What applications are you using at your organization, Select from below:

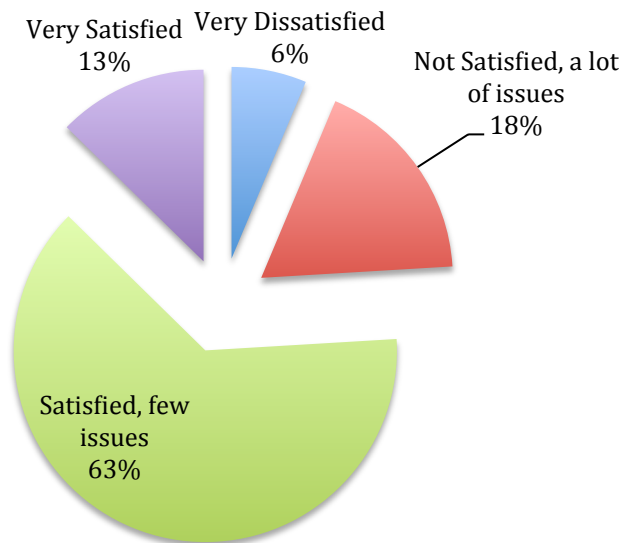
Enterprise resources planning (ERP for HR, Finance, Payroll, Procurement)	20.50%
Customer Relation management (CRM)	13.25%
On line self services	12.62%
Enterprise content management or Document management system	11.67%
Scanning and archiving system	5.68%

Workflow management system or electronic business process workflow	16.09%
Other applications that automate one or more of your core business activities	20.19%
Count	317



Q11: Are you satisfied with the performance and outcome from the applications you selected in the previous question?	
Very Dissatisfied	6.33%
Not Satisfied, a lot of issues	17.72%
Satisfied, few issues	63.29%
Very Satisfied	12.66%
Count	79

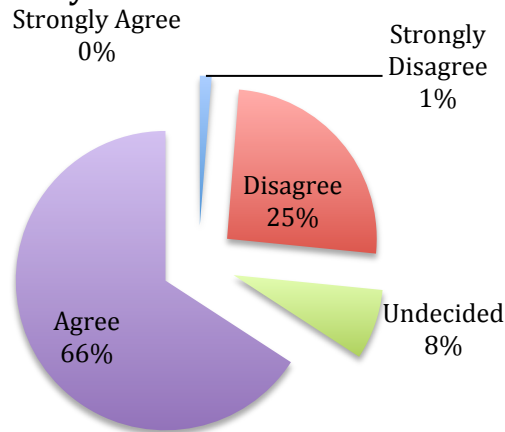
**Q11:Are you satisfied with the performance and outcome from the applications you selected in the previous question?**



Q12: Describing your organization, what do you think for the below statements:

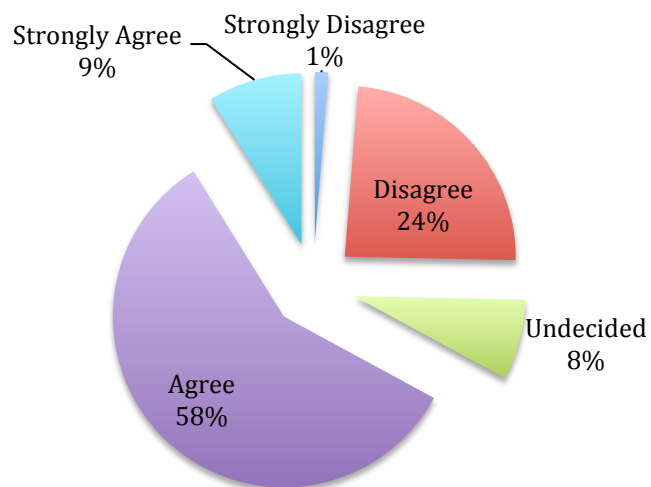
IT projects rarely fail to deliver the business value	
Strongly Disagree	1.27%
Disagree	25.32%
Undecided	7.59%
Agree	65.82%
Strongly Agree	0.00%
Count	79
Mean	3.38

### IT projects rarely fail to deliver the business value



The IT strategic initiatives are linked with the organization strategy	
Strongly Disagree	1.27%
Disagree	24.05%
Undecided	7.59%
Agree	58.23%
Strongly Agree	8.86%
Count	79
Mean	3.49

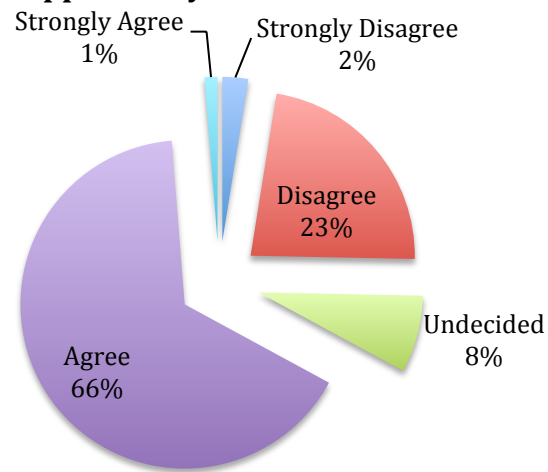
### The IT strategic initiatives are linked with the organization strategy



The decisions to obtain new IT solutions are justified and supported by

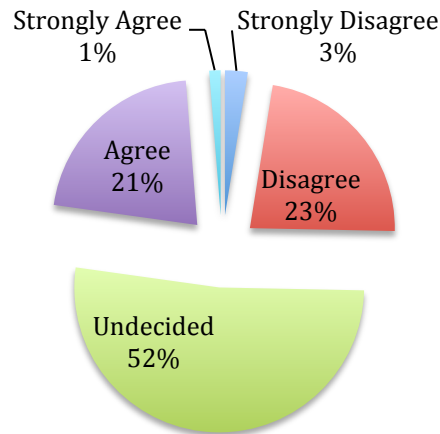
business value	
Strongly Disagree	2.53%
Disagree	22.78%
Undecided	7.59%
Agree	65.82%
Strongly Agree	1.27%
Count	79
Mean	3.41

**The decisions to obtain new IT solutions are justified and supported by business value**



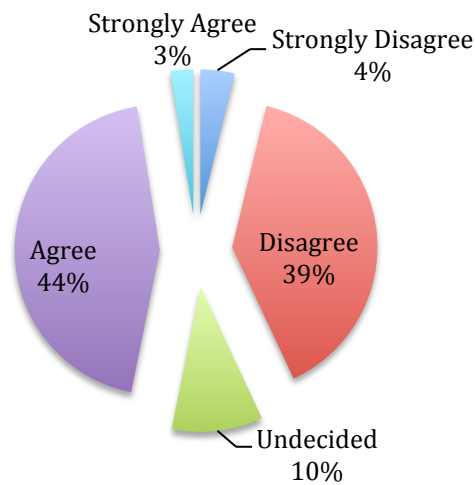
IT projects achieved the expected return of investment (ROI)	
Strongly Disagree	2.53%
Disagree	22.78%
Undecided	51.90%
Agree	21.52%
Strongly Agree	1.27%
Count	79
Mean	2.96

### IT projects achieved the expected return of investment (ROI)



Users are satisfied with the quality of services provided through the business process automation	
Strongly Disagree	3.80%
Disagree	39.24%
Undecided	10.13%
Agree	44.30%
Strongly Agree	2.53%
Count	79
Mean	3.03

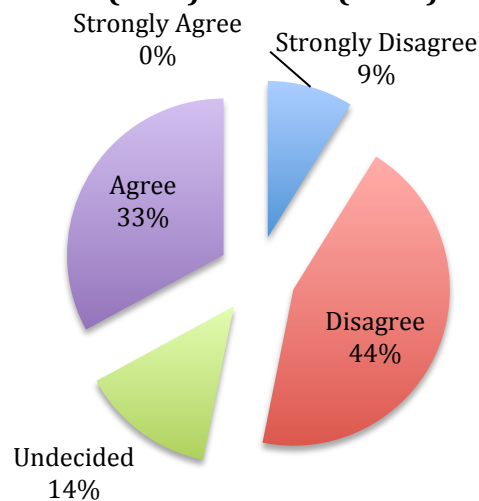
### Users are satisfied with the quality of services provided through the business process automation





There is a clear road-map between IT and business to transition between current situation of business process automation (as-is) to future (to-be) situation	
Strongly Disagree	8.86%
Disagree	44.30%
Undecided	13.92%
Agree	32.91%
Strongly Agree	0.00%
Count	79
Mean	2.71

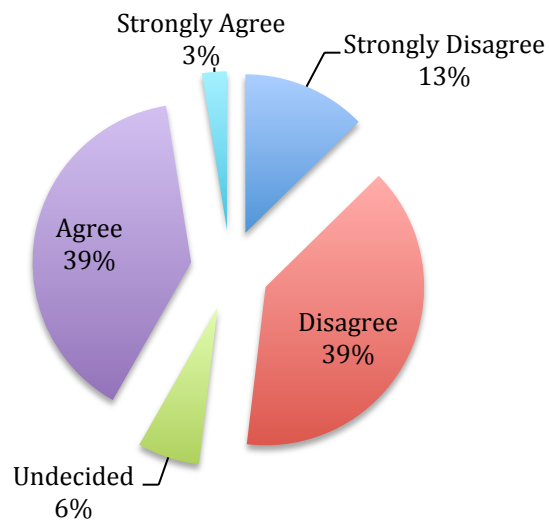
**There is a clear road-map between IT and business to transition between current situation of business process automation(as-is) to future(to-be) situation**



The business processes of your organization are clear and well defined	
Strongly Disagree	12.66%
Disagree	39.24%
Undecided	6.33%
Agree	39.24%
Strongly Agree	2.53%
Count	79

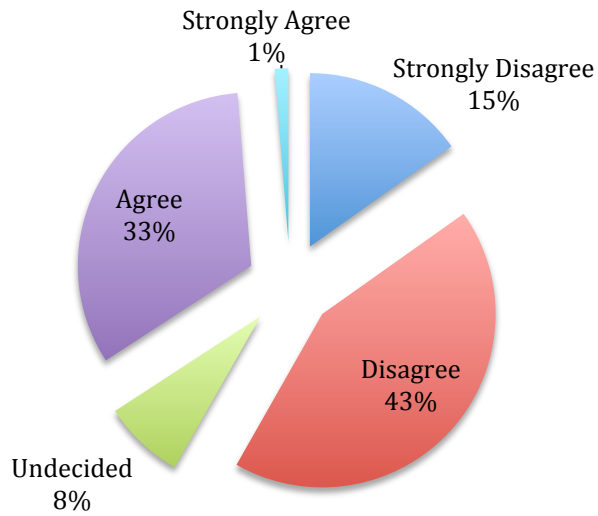
Mean	2.80
------	------

**The business processes of your organization are clear and well defined**



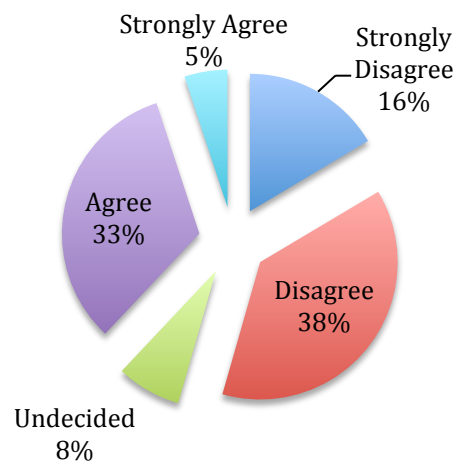
The business processes of your organization are maintained and updated periodically	
Strongly Disagree	15.19%
Disagree	43.04%
Undecided	7.59%
Agree	32.91%
Strongly Agree	1.27%
Count	79
Mean	2.62

**The business processes of your organization are maintained and updated periodically**



The performance of business processes at your organization are measured periodically for improvement chances	
Strongly Disagree	16.46%
Disagree	37.97%
Undecided	7.59%
Agree	32.91%
Strongly Agree	5.06%
Count	79
Mean	2.72

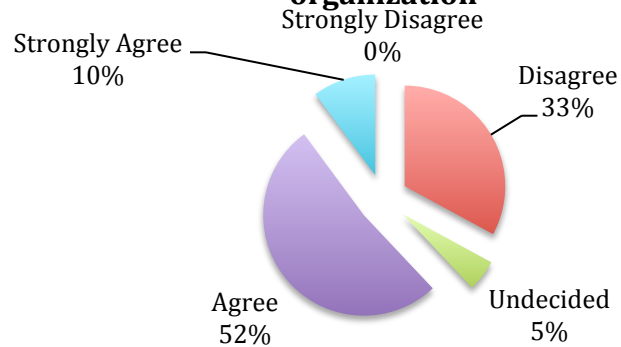
**The performance of business processes at your organization are measured periodically for improvement chances**



Q:13 Describing your organization, what do you think for the below statements as root cause for the business process automation issues:

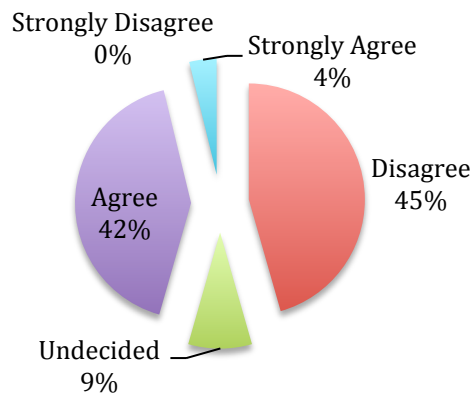
Business requirements and needs are not clear a cross the organization	
Strongly Disagree	0.00%
Disagree	32.91%
Undecided	5.06%
Agree	51.90%
Strongly Agree	10.13%
Count	79
Mean	3.39

**Business requirements and needs are not clear a cross the organization**



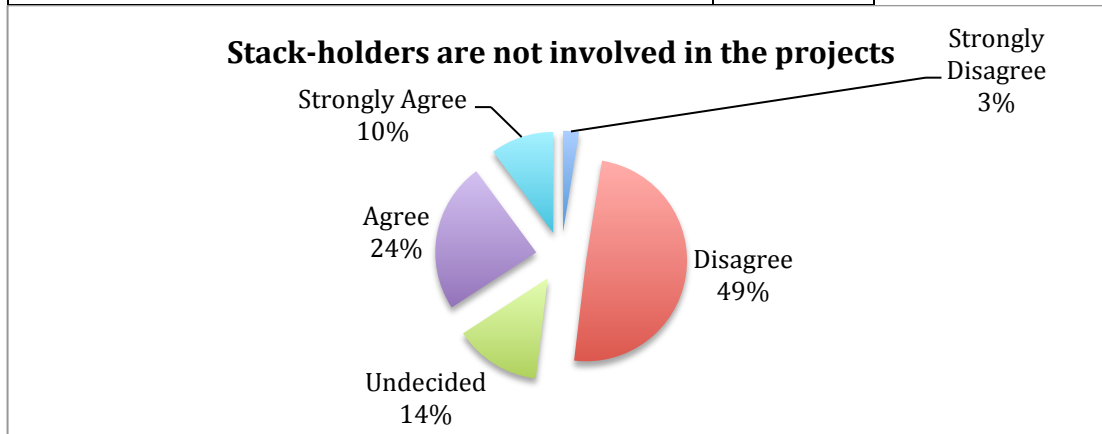
Lack of communication between IT and business units	
Strongly Disagree	0.00%
Disagree	45.57%
Undecided	8.86%
Agree	41.77%
Strongly Agree	3.80%
Count	79
Mean	3.04

**Lack of communication between IT and business units**

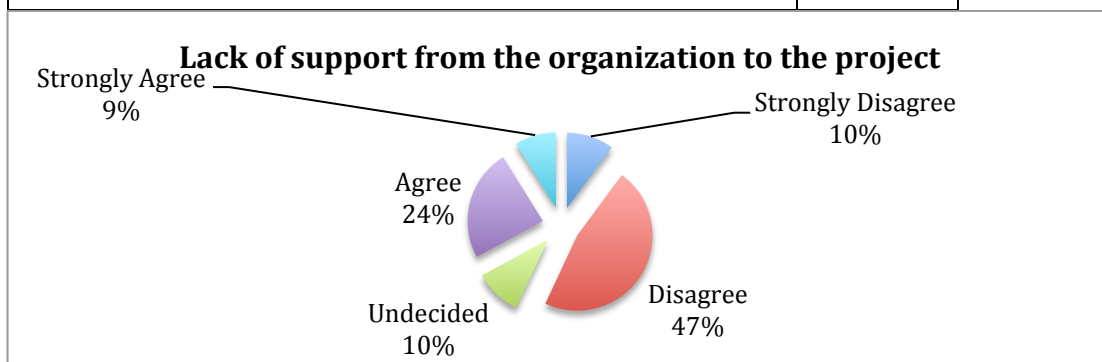


Stack-holders are not involved in the projects	
Strongly Disagree	2.53%
Disagree	49.37%

Undecided	13.92%
Agree	24.05%
Strongly Agree	10.13%
Count	79
Mean	2.90

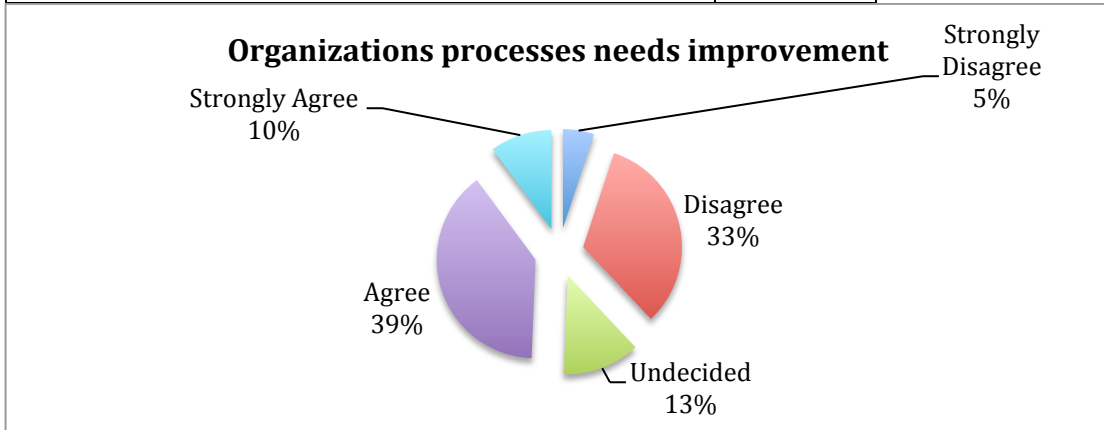


Lack of support from the organization to the project	
Strongly Disagree	10.13%
Disagree	46.84%
Undecided	10.13%
Agree	24.05%
Strongly Agree	8.86%
Count	79
Mean	2.75

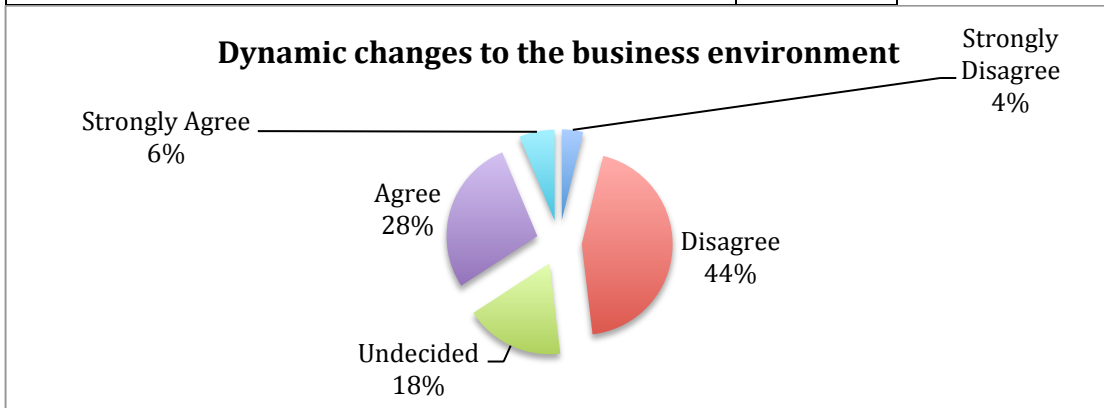


Organizations processes needs improvement	
Strongly Disagree	5.06%

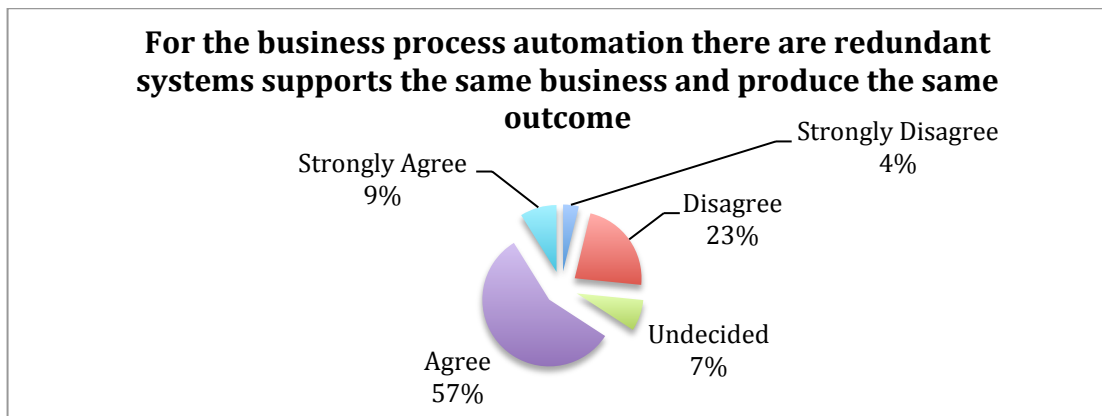
Disagree	32.91%
Undecided	12.66%
Agree	39.24%
Strongly Agree	10.13%
Count	79
Mean	3.16



Dynamic changes to the business environment	
Strongly Disagree	3.80%
Disagree	44.30%
Undecided	17.72%
Agree	27.85%
Strongly Agree	6.33%
Count	79
Mean	2.89



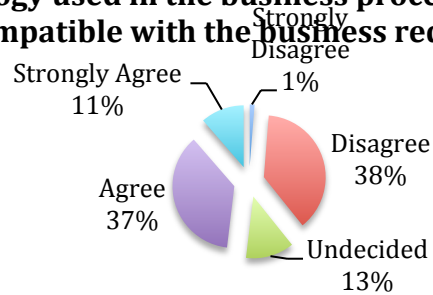
For the business process automation there are redundant systems supports the same business and produce the same outcome	
Strongly Disagree	3.80%
Disagree	22.78%
Undecided	7.59%
Agree	56.96%
Strongly Agree	8.86%
Count	79
Mean	3.44



The technology used in the business process automation is not compatible with the business requirements	
Strongly Disagree	1.27%
Disagree	37.97%
Undecided	12.66%
Agree	36.71%
Strongly Agree	11.39%
Count	79
Mean	3.19

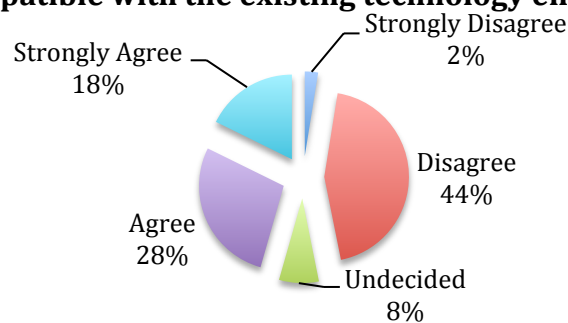


**The technology used in the business process automation is not compatible with the business requirements**



The technology used in the business process automation is not compatible with the existing technology environment	
Strongly Disagree	2.53%
Disagree	44.30%
Undecided	7.59%
Agree	27.85%
Strongly Agree	17.72%
Count	79
Mean	3.14

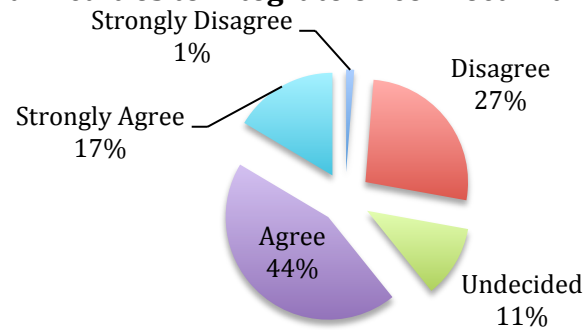
**The technology used in the business process automation is not compatible with the existing technology environment**



Existing technology for business process automation have difficulties to integrate or connect with others	
Strongly Disagree	1.27%
Disagree	26.58%

Undecided	11.39%
Agree	44.30%
Strongly Agree	16.46%
Count	79
Mean	3.48

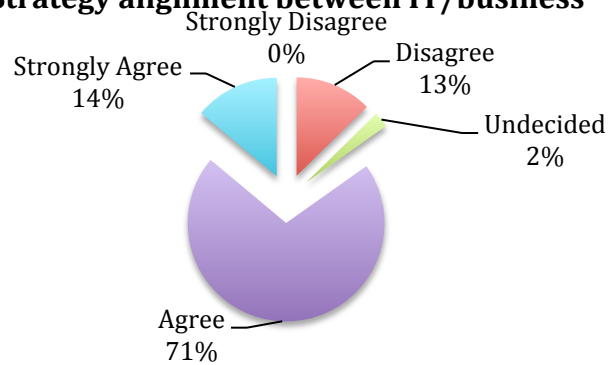
**Existing technology for business process automation have difficulties to integrate or connect with others**



Q14: What do you think of the below statements as success factors for business process automation projects:

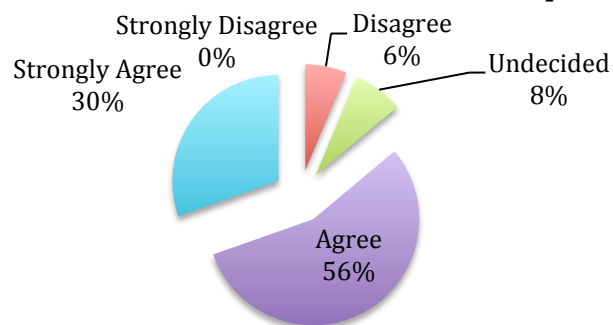
Strategy alignment between IT/business	
Strongly Disagree	0.00%
Disagree	12.66%
Undecided	2.53%
Agree	70.89%
Strongly Agree	13.92%
Count	79
Mean	3.86

### Strategy alignment between IT/business



Requires clear and documented business requirements	
Strongly Disagree	0.00%
Disagree	6.33%
Undecided	7.59%
Agree	55.70%
Strongly Agree	30.38%
Count	79
Mean	4.10

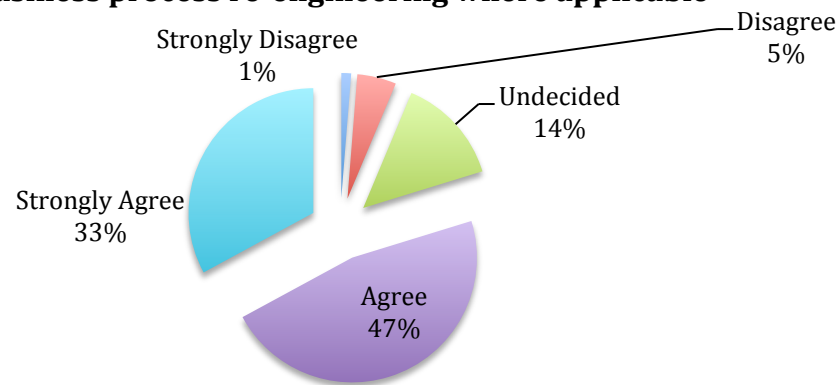
### Requires clear and documented business requirements



Business process re-engineering where applicable	
Strongly Disagree	1.27%
Disagree	5.06%

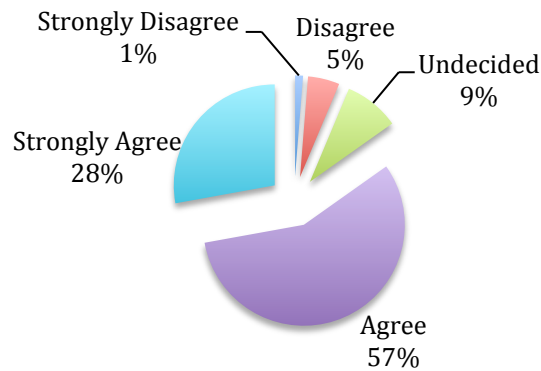
Undecided	13.92%
Agree	46.84%
Strongly Agree	32.91%
Count	79
Mean	4.05

**Business process re-engineering where applicable**



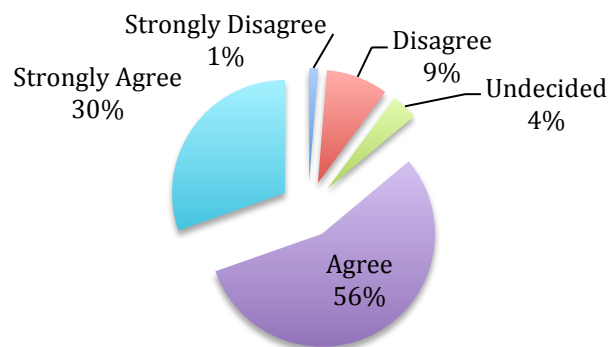
Stakeholders involvement in the project to support decisions	
Strongly Disagree	1.27%
Disagree	5.06%
Undecided	8.86%
Agree	56.96%
Strongly Agree	27.85%
Count	79
Mean	4.05

### Stakeholders involvement in the project to support decisions



Using a measured mechanism and tool for decision support	
Strongly Disagree	1.27%
Disagree	8.86%
Undecided	3.80%
Agree	55.70%
Strongly Agree	30.38%
Count	79
Mean	4.05

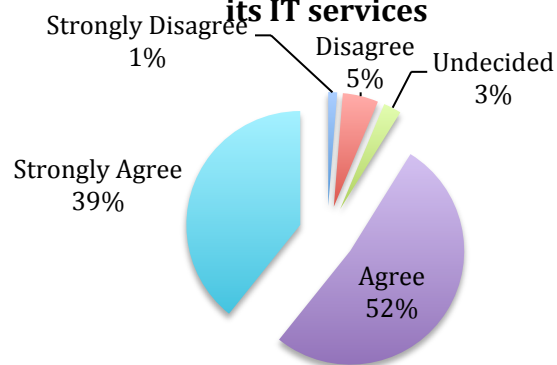
### Using a measured mechanism and tool for decision support



Monitor and track performance of business processes with its IT services	
Strongly Disagree	1.27%

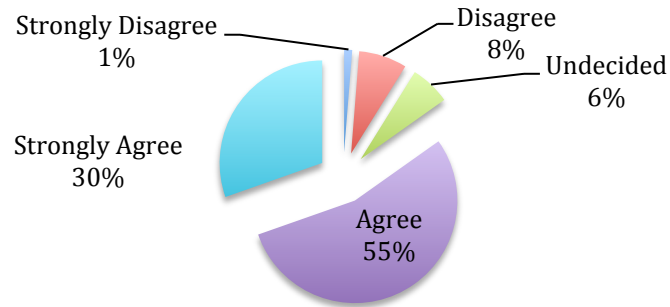
Disagree	5.06%
Undecided	2.53%
Agree	51.90%
Strongly Agree	39.24%
Count	79
Mean	4.23

**Monitor and track performance of business processes with its IT services**



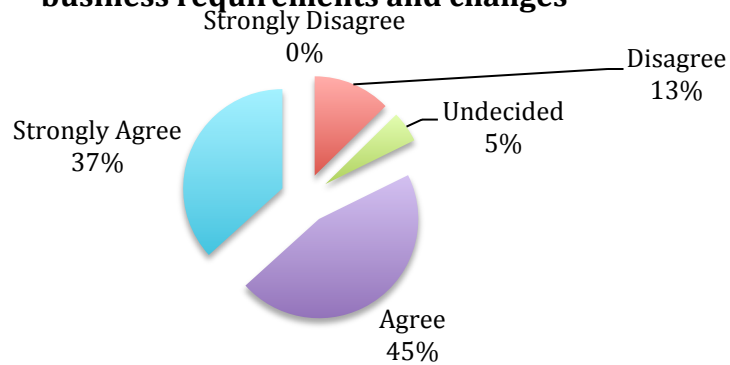
Enhance the evaluation of new technology or systems in regard to the business value and avoid redundancy	
Strongly Disagree	1.27%
Disagree	7.59%
Undecided	6.33%
Agree	54.43%
Strongly Agree	30.38%
Count	79
Mean	4.05

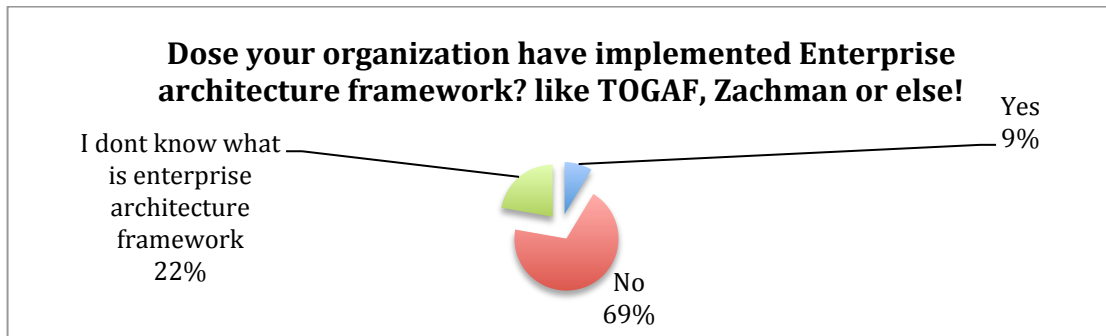
**Enhance the evaluation of new technology or systems in regard to the business value and avoid redundancy**



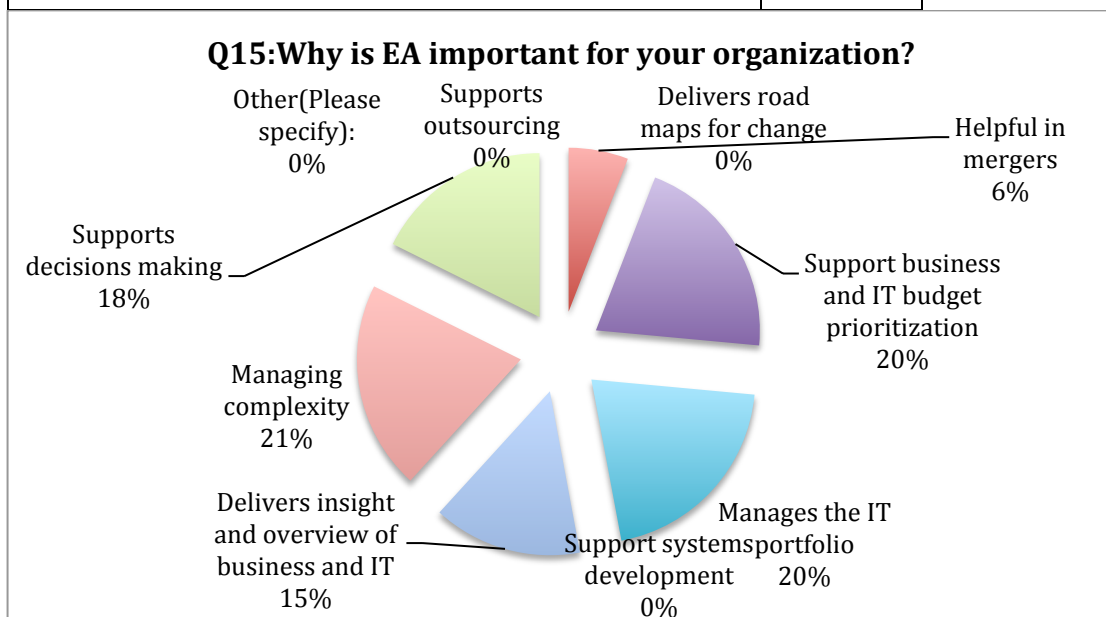
Existing technology needs continues assessment against business requirements and changes	
Strongly Disagree	0.00%
Disagree	12.66%
Undecided	5.06%
Agree	45.57%
Strongly Agree	36.71%
Count	79
Mean	4.06

**Existing technology needs continues assessment against business requirements and changes**



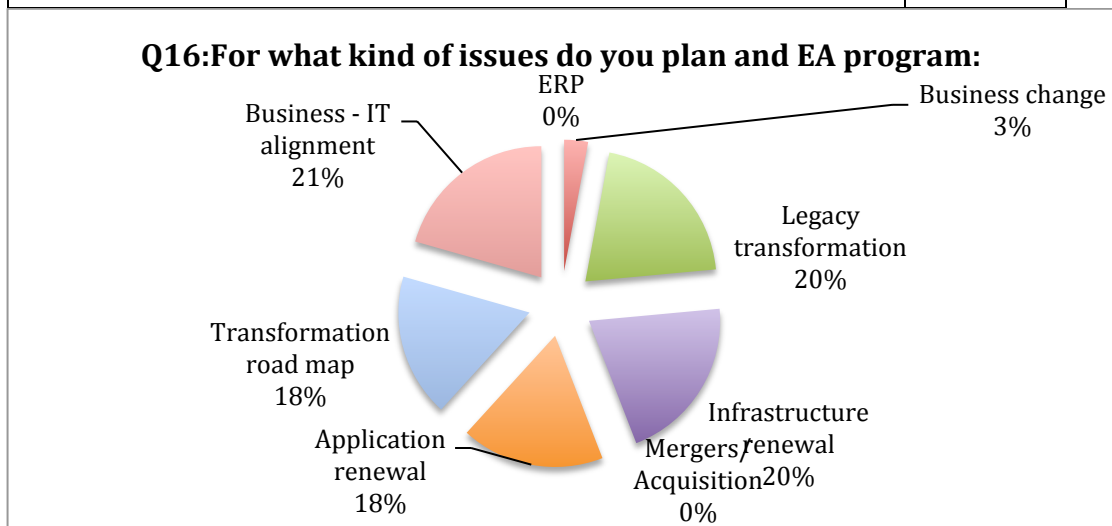


Q15: Why is EA important for your organization?	
Supports outsourcing	0.00%
Helpful in mergers	5.88%
Delivers road maps for change	0.00%
Support business and IT budget prioritization	20.59%
Manages the IT portfolio	20.59%
Support systems development	0.00%
Delivers insight and overview of business and IT	14.71%
Managing complexity	20.59%
Supports decisions making	17.65%
Other (Please specify):	0.00%
Count	34





Q16: For what kind of issues do you plan and EA program:	
ERP	0.00%
Business change	2.94%
Legacy transformation	20.59%
Infrastructure renewal	20.59%
Mergers/Acquisition	0.00%
Application renewal	17.65%
Transformation road map	17.65%
Business - IT alignment	20.59%
Count	34



Q17: Dose your organization familiar with the importance of EA?	
Yes	57.14%
No	42.86%
Count	7

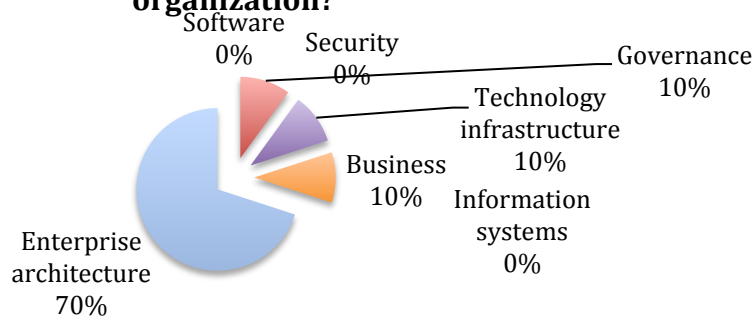
Q18:Is your EA part of your organizations strategic governance?	
Yes	85.71%
No	14.29%

Count	7
-------	---

Q19: Are there any laws or regulations related to EA enforced by the government?	
Yes	100.00%
No	0.00%
Count	7

Q20: what kind of architectures is established in your organization?	
Software	0.00%
Governance	10.00%
Security	0.00%
Technology infrastructure	10.00%
Information systems	0.00%
Business	10.00%
Enterprise architecture	70.00%
Count	10

**Q20:what kind of architectures are established in your organization?**



Q21: At which level is enterprise architecture part of your organization governance structure?	
IT management	77.78%
Middle management	0.00%

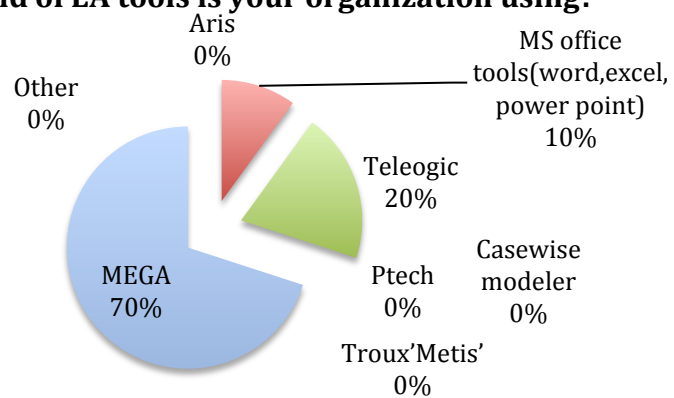
Top management	0.00%
Management board	22.22%
Other (please specify)	0.00%
Count	9

Q22: what kind of EA frameworks dose your organization use:	
Zachman	12.50%
FEAF	0.00%
TOGAF	0.00%
IAF	0.00%
USA DoD	0.00%
ISO/IEC 14252(IEEE std 1003.0)	0.00%
TAFIM	0.00%
TEAF	0.00%
E2AF	0.00%
Organization own	0.00%
Blinded from more than one of the above frameworks	87.50%
Other	0.00%
Count	8

Q23: what kid of EA tools is your organization using?	
Aris	0.00%
MS office tools (word, excel, power point)	10.00%
Teleogic	20.00%
Ptech	0.00%
Casewise modeler	0.00%
Troux'Metis'	0.00%
MEGA	70.00%
Other	0.00%

Count	10
-------	----

**Q23:what kid of EA tools is your organization using?**



## 8. References

‘ADSIC’. (2011). *Technology architecture* [online]. [Accessed 20 April] Available at: <http://adsic.abudhabi.ae/Sites/ADSIC/Navigation/EN/Projects/it-architecture-and-standards,did=110732.html>

Celik, F. (2009). *Enterprise architecture-creating a process for architectural transition*. Master Thesis. Royal institute of technology.

CHAOS. (2009). *CHAOS summary 2009, the 10 laws of CHAOS*. Boston: The standish group international

Chi,A.(2006). *Implementing Enterprise architecture*. MSc. Thesis. Technische university delft.

Congressional research services (2008). *Federal enterprise architecture and E-government: issues for information technology management*. USA:Congressional research services.

Feurer,S.(2007). *Enterprise architecture-organizational structure*. Diploma Thesis. University of Applied Sciences.

Franke,U. & Johnson,P.(2009). *An enterprise architecture for application consolidation in the swedish armed forces. Enterprise distributed object computing conference workshops:EDOCW 2009 13th*. Auckland. 1-4 September. Institute of Electrical and Electronics Engineers:New york.

Gammelgard,M.,Ekstedt,M. & Narman,P.(2010). *A method for assessing the business value of information system scenarios with an estimated credibility of the result*. International journal of services technology and management, vol. 13 (1/2), pp.105-133.

Gartner(2003). *IT spending: Executive Report Series*. [online]. Stamford:Gartner.

[Accessed 30 march 2011] Available  
at:[www.gartner.com/research/attributes/attr\\_47450\\_115.pdf](http://www.gartner.com/research/attributes/attr_47450_115.pdf)

Gartner (2009). *Gartner symposium/ITxpo: IT spending* [online]. Orlando:Gartner.  
[Accessed 30 march 2011]. Available at:  
<http://www.gartner.com/it/page.jsp?id=1209913>

IFEAD(Institute for Enterprise Architecture Developments)(2005). *Trends in enterprise architecture Amersfoort*: Institute for Enterprise Architecture Developments.

Jacobs,D. (2008). *Towards a business process model warehouse framework*. MSc. Thesis. University of South Africa.

Jahani,B., Javadein,S. & Jafari,H.(2010). *Measurement of enterprise architecture readiness within organizations*. Journal of the business strategy series, vol. 11(3),pp.177-191.

Jensen,C.,Cline,O. & Owen,M.(2011). *Combining business process management and enterprise architecture for better business outcomes*[online]. USA:IBM redbooks  
[Accessed 30 march 2011]. Available  
at:<http://www.redbooks.ibm.com/abstracts/sg247947.html?Open>

Josey,A.,Harrison,R.,Homan,P.,Rouse,M.,Sante,T.,Turner,M. & Merwe,P.(2009). *TOGAF version9*. Berkshire:Van haren.

Knippel,R. (2005). *Service oriented enterprise architecture*. MSc. Thesis. IT University of Copenhagan

Koch,C.(2007). *CIO Business technology leadership-IT strategy* [online]. [Accessed 30 march 2011]. Available at: <http://books.google.ae/books>

Manor college (2006). *What is empirical research?*[online]. Jenkintown: Manor college. [Accessed 15 April 2011]. Available at:  
<http://library.manor.edu/tutorial/empiricalresearch.htm>

Mooney,L.(2009). *How to use business process management and enterprise architecture tools to thrive in a recession?* [online]. [Accessed 2 April 2011]. Available at : <http://www.eweek.com/c/a/Enterprise-Applications/How-to-Use-Business-Process-Management-and-Enterprise-Architecture-Tools-to-Thrive-in-a-Recession>

Niemann,I.(2005). *Strategic integrated communication implementation: towards a south African conceptual model-Methodology:empirical research*. Ph.D. Thesis. University of Pretorial etd.

OMB office of management and budget (2005). *National archives and records administration v1.0 Washington,D.C*: Federal enterprise architecture program management office.

OMB office of management and budget (2010). *Circular NO.A-11 preparation, submission and execution of the budget Washington,D.C*: Federal enterprise architecture program management office.

OMB office of management and budget (2007). *FEA practice guidance Washington,D.C*: Federal enterprise architecture program management office.

Raadt,B.(2011). *Enterprise architecture coming of age*. PhD. Thesis. Vrije University.

Raderius,J.,Narman & P.,Ekstedt,M.(2009). *Service oriented computing-ICSOC 2008 workshops lecture notes in computer science*. Berlin:Springer.

Rashid,K.(1999). *Workflow automation: the new frontier of productivity* [online]. [Accessed 10 April 2011]. Available at: [http://findarticles.com/p/articles/mi\\_qa3857/is\\_199901/ai\\_n8831725/?tag=content;coll](http://findarticles.com/p/articles/mi_qa3857/is_199901/ai_n8831725/?tag=content;coll)

Royce,W.(2009). *Improving software economics: top10 principles of archiving agility at scale* [online]. New York:IBM [Accessed 30 march 2011]. Available at: <ftp://public.dhe.ibm.com/common/ssi/ecm/en/raw14148usen/RAW14148USEN.PDF>

Saat,J.,Franke,U.,Lagerstrom,R. & Ekstedt,M.(2010). *Enterprise architecture meta models for IT/Business alignment situations. Enterprise distributed object computing conference workshops:EDOCW 2010 14th*. Vitoria. 14-23 October. IEEE computer sociality:Washignton.

Saenz,O.(2005). *Framework for enterprise systems engineering*. Ph.D. Thesis. Florida International University.

Sajjad,F.,Lee,H.,Kamal,M. & Irni,Z.(2011) *Workflow technology as an e-participation tool to support policy-making processes*. Journal of Enterprise information management, vol. 24 (2), pp.197-212.

Sessions,R.(2007). *A Comparison of the Top Four Enterprise-Architecture Methodologies*[online]. [Accessed 28 March 2011]. Available at:  
[http://msdn.microsoft.com/en-us/library/bb466232.aspx#eacompar\\_topic4](http://msdn.microsoft.com/en-us/library/bb466232.aspx#eacompar_topic4)

Swthinkbank, P., Chessell,M., Gardner,T., Griffin,C., Man,J., Wylie, H. & Yusuf,L.(2005). *Patterns:model driven development using IBM rational software architect*. Viewed 30 March 2011.  
<http://www.redbooks.ibm.com/redbooks/pdfs/sg247105.pdf>

Tatum,M. (2011). *What is business process automation?*[online]. [Accessed 10 April 2011]. Available at: <http://www.wisegeek.com/what-is-business-process-automation.htm>

The Open Group. (2008) *Why dose enterprise architecture matter?* San Francisco:The Open Group.

The Open Group (2006). *The open group architecture framework: Architecture governance* [online]. San Francisco:The open group [Accessed 10 march 2011]. Available at: <http://pubs.opengroup.org/architecture/togaf8-doc/arch/chap26.html>



Thorn,S.(2011). *Cloud computing requires enterprise architecture and TOGAF9 can show the way*[online]. [Accessed 10 march 2011]. Available at:  
[http://www.architecting-the-enterprise.com/pdf/presentations/cloud\\_computing\\_requires\\_enterprise\\_architecture\\_and\\_togaf9\\_can\\_show\\_the\\_way.pdf](http://www.architecting-the-enterprise.com/pdf/presentations/cloud_computing_requires_enterprise_architecture_and_togaf9_can_show_the_way.pdf)

Tutorgig(2010). *Enterprise architecture*[online].*Center of advancement of the enterprise architecture profession*. [Accessed 10 April 2011]. Available at:  
[http://www.tutorgig.com/ed/Enterprise\\_architecture#Relationship\\_to\\_other\\_disciplines](http://www.tutorgig.com/ed/Enterprise_architecture#Relationship_to_other_disciplines)

Veger, M. (2008). *Wide services oriented architecture: a multi-case study research*. MSc. Thesis. University of Twente

Weibelizahl,S.,Weber,G.(2010). *Advantages, opportunities, and limits of empirical evaluations: evaluating adaptive systems* [online]. University of education freiburg. [Accessed 15 April 2011]. Available at:  
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.18.7909&rep=rep1&type=pdf>

Wikipedia(2011). *Enterprise architecture* [online]. [Accessed 10 April 2011]. Available at: [http://en.wikipedia.org/wiki/Enterprise\\_architecture](http://en.wikipedia.org/wiki/Enterprise_architecture)

Zachman,J.(2003). *The zachman framework for enterprise architecture: primer for enterprise engineering and manufacturing*[online]. Zachman [Accessed 1 April 2011]. Available at: <http://www.zachmaninternational.com>