Enterprise Architecture & Alignment

How alignment issues handled within Enterprise Architecture?

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Master of IT Management Thesis

ABSTRACT

As businesses enter to the twenty first century, they have to cope with an uncertainty, which is caused by dynamic environment. In one hand uncertainty might cause by the strategic role of IT and its significant effects within an enterprise and in another hand, it may threat organization by changing demands from customers. Based on whatever the sources of uncertainty are, organization in general and IT management specifically must deal with them and be prepared for future changes. In this sense, alignment between business and IT are crucial. For this reason, the alignment must be available as guidelines and help an organization transformation relatively. This possibility would be provided by using architectural frameworks within an enterprise.

This report is based on comparative study of well-known frameworks such as Zachman, TOGAF and FEAF with alignment patterns such as Infological alignment, Socio-structural alignment, Functional alignment, Socio-cultural alignment and Contextual alignment. The main idea of the research is to reflect those alignments patterns in architectural frameworks. Due to the fact that those enterprise architectural frameworks have the lack of commonality, reflecting alignment patterns may help organization to raise their knowledge about essential contributing factors, which would consequently lead them to choose an appropriate architectural framework, which suits them best.

Keywords: IT Management, Enterprise Architecture and Alignment

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1 INTRODUCTION

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This chapter provides a background for the master thesis and gives the reader an introduction to the subject. Furthermore, the problem description, the research purpose and the research question will be presented. And at the end of this chapter, the report's disposition will be represented as well.

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1.1 Background

During the last decades, organizations are facing a world full of uncertainty and turbulence in their business environment. Increased dynamicity and complexity, globalization, de-regulation of markets, increased market competition and higher demands from customers are among the fundamental forces that organization are facing. Those demands in one hand and rapid development of information technologies' functions in another hand forces organization to realize that traditional organizational structure is no longer sufficient to react to their problems. Those facts lead organization to recognize emerging to have modern enterprise and the concept of strategic management (Pessi, 2009).

Another important aspect for modern organizations is to consider the increasing dependence and close integration between IS/IT, new business and organizational forms. This may relate the need for having adequate forms of IS/IT architecture (Pessi, 2010). The word "architecture" is among the words, which nowadays has been using much in the world of information technology. According to Pessi and Magoulas (1998) the word "architecture" is going to replace of the word "structure" in overall terms. Hugoson et al (2008) mentioned that since 1970's, organizations are spending huge amount of money for building new information systems. Yet there have been seen some obstacles in that respect which are:

1) The fast growing amount of systems which in most cases are integrated in ad hoc manner have been expected to increase the cost and complexity of information systems. 2) Organizations were finding it more and more difficult to keep these information systems in alignment with business needs. 3) The role of information systems has changed during this time, from automation of routine administrative tasks to a strategic and competitive weapon. For answering all those obstacles, a new field of research was born that soon become known as Enterprise Architecture. After those developments in the field of Enterprise Architecture, several frameworks were created like Zachman, The Open Group Architecture Framework (TOGAF), Federal Enterprise Architecture Framework (FEAF) and etc.

The expressed reason for having Enterprise Architecture is that it provides blueprints for organization, for those who own, construct and maintain the building with the clear understandable picture of building's uses, its features and characteristics, and supporting systems. This includes relevant building components and governs the construction process. Enterprise architecture supplies to people at all organizational level an explicit, common, and meaningful structural frame of reference. Furthermore, it allows an understanding of important facts such as: 1) What the Enterprise does; 2) when, where, how and why it does that; 3) What it uses to do it (GAO, 2003). In general view and regarding modern organization, Magoulas et al (2011) mentioned that having enterprise architecture as a blue print is not just limited to improve competiveness, but also reduce complexity,

increase changeability and provide a basis for evaluation etc, yet few enterprises have managed to derive these effects from enterprise architecture (Pessi, 2010).

1.2 Problem description

One of the issues that Enterprise Architecture should resolve the question of alignment; indeed Svärdström et al (2006) mentioned the fact that Enterprise Architecture was created to address many issues such as alignment between IS/IT and businesses. When reviewing articles about IT management, one finds many discussions about the concept of alignment such as strategic alignment, dynamic alignment and so on. Meanwhile there has been much discussion about the different Enterprise architectures frameworks such as Zachman, TOGAF, FEAF and the others, yet there is no relevant literature found regarding the application of those constructive alignment patterns on different Enterprise architecture frameworks. This leads me to the question of how those alignments patterns apply as "guidelines" on those different architectural frameworks.

Respect the fact that different organizations apply different enterprise architectural frameworks and alignment factors are much dependent on each other's (Svärdström et al 2006), there can be problematic if some constructive factors of alignment are missing in one-enterprise architecture frameworks. This shortage will mutually affect the whole enterprise. This, in one hand and the lack of commonality of different Enterprise Architectural frameworks in another, shortage of documentation respect to alignment and Enterprise Architecture, leads me to investigate those domains.

1.2.1 Purpose and Research Question

By investigating different aspects of alignment and Enterprise Architecture, this report will focus on two main areas: the first is the alignment between information system and other constructive factors among businesses and the second is the consideration of the alignment pattern in three architectural frameworks. As a baseline for analyzing alignment pattern, I used The Framework for Understanding Enterprise Morphology (FEM Model) and try to find out how those patterns are treated on well-known architectural frameworks such as Zachman, TOGAF and FEAF. It will also explain the terminology and discuss the important of considering alignment factors on different Enterprise Architecture frameworks. The purpose of this dissertation is to investigate those alignment aspects on different architectural frameworks with the aim of:

1) Exploring the research question,
2) Establishing a comparison between different Enterprise Architectural frameworks with respect to alignment application, and
3) Developing and providing guideline principles for managing dynamic alignment between business and IT.
Based on the mentioned purpose, I reached the following question:

How alignment issues handled within Enterprise Architecture Frameworks?

1.3 Disposition

This paper has been organized in six sections plus, literature references and appendices.

Chapter 1: Introduction

This chapter describes the background of the report namely beginning with explaining the historical background in terms of development within the areas of IS/IT; it also discusses the barriers, which organizations have faced. It also contains the problem description, the purpose of the report, the research question and the thesis disposition.

Chapter 2: Method

In this chapter, I explain how the research has been conducted. It will present the research approach, method and collecting data and literature review.

Chapter 3: Theoretical frameworks

Chapter 3 will begin with the presentation of the theoretical framework such as historical review of IT management, Enterprise Architecture and the concept of alignment. As examples of alignment patterns, the two frameworks for Enterprise Architecture namely the Strategic Alignment Model and The Framework for Understanding Enterprise Morphology will be represented.

Chapter 4: Study objects

Enterprise Architectures frameworks will be described in this chapter. As an example of those architectural frameworks, TOGAF, Zachman and FEAF will be presented.

Chapter 5: Discussion

This chapter, namely discussion, contains the comparison analysis of the literatures.

Chapter 6: Conclusion

The report will end by this part namely conclusion which highlights the most significant aspects of research findings.

2 RESEARCH METHOD

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In this chapter, I explain how the report conducted and base on which method this master thesis was made. The chapter contains research approach, method and data collection and literature reviews.

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2.1 Research approach

A method can be used as a tool and as a way for solving problems via new obtained knowledge. Sociological method considering both comprising organization and interpreting of information, which helps to gain a better understanding of the society (Riley, 1963) while reflecting true knowledge of reality from theory is the tasks that every researcher struggles with. The theory usually refers to gathering data and information in which part of reality is being studied. According to Patel and Davidson (2003) this material is often called empirical work. The researcher's work consists of linking theory and reality and struggle with the question of "how" those two concepts should be related to each other. As alternative ways, the authors represented the three alternatives methodological views, which are called, Deduction, Induction and Abduction.

Deduction is popular methodological approach that researcher use for following path and evidence deductively i.e. to use general principles and existing theories for draw conclusion about each individual phenomenon. Based on existing theory, hypothesis is usually created which the researchers called hypothetical-deductive. The existing theory allows researcher to decide what information has to be collected, how to interpret that information and how to relate the gaining results to the existing theory.

Induction refers to the methodological view in which researchers follow path of detection, i.e. to study the object of research and based on the gathered information and empirical study formulate a theory. In this method, researchers have their own ideas and beliefs that will inevitably affect the theories.

Abduction is the third methodological alternative and formed by combining deduction and induction. It has been based on creating more than one stage i.e. begin from individual case for formulating hypothesis (induction), creating preliminary theory and proceeding to apply the created hypothesis or theory to new cases (deduction). In this method, the original hypothesis or theory can be developed and expanded to be more general which in some case lead to creating a secondary theory.

This report applies a deductive methodological approach where theory and literary study will form the basis for research into the domains of alignments and enterprise architecture frameworks.

It is also important for the researcher to distinguish between "Quantitative" and "Qualititative" methods (Hartman, 1998, Olsson and Sörensen, 2001). According to Hyde (2000), deduction, induction and abduction research methodologies are often associated with qualitative and quantitative research methods.

Quantitative method is characterized by examining the numerical relationships between two or more measurable properties. Qualitative methods usually involves working with

structured and pre-formulated types of questions in which in most cases, based on specified theory and out from the hypothesis, can be verified or rejected. The purpose of **qualitative research** on the other hand is to reach an understanding of the natural values of an individual or a group of individuals. In this method, researchers work with unstructured problems derived from theories, which lead them to reach different thoughts, ideas and hypotheses.

A qualitative method will be applied in this report since it is characterized by flexibility. However obtaining flexibility according to Holme and Solvang (1997) has both advantages and disadvantages. The advantage is the possibility to reach better understanding of the research question and the disadvantage is that the comparison of reached conclusion can be difficult. Adopting a qualitative approach, I used theoretical material in the area of alignment and enterprise architecture in order to gain rich knowledge and deeper understanding of the problem area.

2.2 Method and Data Collection

Qualitative data collection may refer to one or more of the following aspects: interviews, focus group, observation, case study, documentation and literature study (Olsson and Sörensen, 2001). The authors mention that they are some general aspects, which have been observed when collecting data using qualitative methods:

-Information collection and analysis should take place within interaction phase
- Apply systematic and comprehensive approach to determining categorization
-Researchers are constantly in contact with data
-Segmentation takes place in various concepts
-Researchers put segmentation of categories together, which leads to categorization
-Continues comparison during the research
-Standardization is difficult
-The method is time-consuming

As it mentioned before, the qualitative research method has been applied in this research and therefore the method for collecting data also refer to qualitative data collection; however in this report, the empirical study is limited to literature study i.e. the collecting data has been based on gathering different literatures within Informatics and management domains. The above mentioned characteristics have been applied in this report as well; however some aspect such as continues comparison between different point of views and categorization of various data have been most applied in this report.

2.3 Literature review

In order to fully comprehend the problem area, it's necessary to read already published material before beginning the work. The contribution of previous research in the relevant field will lead to better understanding of new working domain (Backman, 1998). In this report, the literary study began in the form of a planning report in the beginning of spring term (2011). The purpose of literary study is to provide a wide view of related domains, give knowledge about them and then explore and extract more knowledge from them and ultimately answer the report question. Since the method for collecting data in this report has been limited to literature studying and the comparison of different theories, the choice of literature studying is extremely important in this report. The literatures have been chosen based on the relevancy, actuality and availability of them Meanwhile some

literature has been selected by the recommendation of supervisor (Kalevi Pessi). Some of the articles and books, used in literature study, have been gathered from Chalmers Lindholmen library in Gothenburg University and the others have been gathered based on previous courses attended as part of IT management master program. In order to develop the knowledge about the research domain, some key terms have been found via Internet in a form of online dictionary and Wikipedia. The literature studying helps me comprehend the different viewpoints concerning the area of IT management. It also helps me to identify the alignment pattern in common Enterprise architectural frameworks used by today's organizations. Basically, those studying helped me to deepen my knowledge, progressing in my learning process, developing my writing skills for this Master thesis and also providing me the opportunity to compare and analyze the used literatures in other perspective.

3 THEORETICAL FRAMEWORKS

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In this chapter, the relevant theoretical finding will be presented .The chapter begins with explaining the concept of IT management, the historical review behind the revolution of enterprise architecture and the question of having alignment in IT management while it representing the two comprehensive models of enterprise architecture for the better recognition of alignment patterns.

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3.1 IT Management

Today, most organizations in all parts of industry, government and commerce are dependences on their information systems and information technology whereas the information technology itself has become inextricably intertwined with business (Ward and Peppard, 2002). The authors provide a view of industrial revolution such as telecommunication; media, entertainment and financial services, insisted that the existence of an organization crucially depends on the effective application of information technology when product has already digitalized or going to be increasingly digitalized. For organization, providing those tasks is not only to keep the existing of businesses but also to create new opportunities that provide a source of competitive advantages. Those needs and requirements lead organization to have another form of management as IT management or according to Ward and Peppard's definition "Strategic IT management".

3.1.1 IT Management's Definitions:

Wikipedia (2011) refer to IT management as disciplines for managing all technology resources within an organization, which compatible to firm's needs and priorities. Those resources include tangible investments such as computer software, hardware, data, networks and data centre facilities or may relate to the hired staff for maintaining them. Managing those responsibilities in an organization required many basic management functions like budgeting, organizing, staffing, controlling, change management, software design, technology supporting, network planning and others.

Wikipedia also define that a primary focus of IT management is to create value as possible extent by technology and that requires the alignment of technology and business strategy. In another hand, creating value for an organization depends largely on network relations of internal and external environments and the technology itself. Moreover, those tasks require that technology and business managements work as creative, collaborative and synergistic team (Wikipedia, 2011).

According to Pessi and Magoulas (1998), IT management refers to "the judicious organization of technological means to accomplish individual and social ends". They also refer to IT management as a bridge between Enterprise and information system which through management, organizing and architectural design, organization can increase the existing business value as well as future IT investment i.e. explore the new business opportunities. The authors considered IT management as art of changing and improving the relatively heterogeneous and dynamic information environment in a conscious and organized fashion. Moreover they quoted that the IT management is expected to harmonize the organizations' heterogeneous and shifting goals with both existing and planned information systems.

3.1.2 The relation ship between IT management, Enterprise architecture and alignment

Today, after decades of research and development, a lack of accepted models for guiding IT management had been a major concern. This may refer to different points of view to IT-management in basic points and focuses (Pessi and Magoulas, 1998). During the recent decades, different models and frameworks have been created for organization in order to developing their enterprise architecture. However, those frameworks design for different organization depends of what they focusing. Some organization focusing in special industrial sections, while the others focus on strategies (Butler Group, 2004). As an important fact, Pessi and Magoulas (1998) mentioned the importance of the fact that most guideline models provides views for IT managements with different focuses, yet they share the characteristic that the architecture metaphor plays a main role and therefore the concept of Information environment and administrating the IS architecture evolved further within organizations.

Those views lead organization to have another perspective of management as "Architectural IT-management" which refers to interplay between different architectural conceptions or dimensions. Pessi et al (2010) mentioned that to handle complexity caused by strategic role of IT and its significant throughout organization, the change is needed and that cause IT management to deal with uncertainties, complexities and new demands in another perspectives i.e. more attention to the enterprise architectural concept. According to the authors Enterprise architecture has a significant role in improving management practice. Therefore their frameworks should be more and more critical for the creation of attractive information environments. In Enterprise architectural domain there are three sub- domain defines as: Business architecture, IS architecture and Technical architecture (see figure 1, page 14).

Another central concept within the area of architectural IT- management is the question of alignment. For representing alignment, there have been several models created. Examples of those models are: Strategic alignment model by Henderson and Venkatraman (1993) and The Framework for Understanding Enterprise Morphology (FEM model) by Svärdström et al (2006) (see figure4, page 22). According to Pessi et al (2011) enterprise architecture express a strategic alignment/ misalignment between business architecture, information architecture and IT architecture. Therefore, the enterprise architecture frameworks should provide guidelines for managing short terms operational alignments as well as long terms strategic alignments.

Considering the fact the most past architectural models were focused on Technical architecture, representing the FEM model created a new evolution in architectural work, which was focusing on business and IS architecture domains. Svärdström et al defined five relation areas in FEM Model which are: Infological relation, Socio-culture relation, Functional relation, Socio-cultural relation and contextual relation. Magoulas et al (2011) pointed out that the relation of those areas combined with IS/IT referred to the concept of "Alignment". According to the authors, integration of those relation areas together with IS/IT would create a good foundation for coordinated business development.

3.2 Enterprise Architecture

"Architectural framework is an instrument, which can be used for developing a board range of different architectures". It allows defining and documenting of enterprise architecture (TOGAF, version, 8.1.1). The Enterprise Architecture itself in another hand is the concept, which becomes increasingly widespread in IT management research and practice. Enterprise Architecture provides the organizing logic for business processes and information technology i.e. to providing organization, functional or mission area, a clear and comprehensive picture of their structures. Enterprise Architecture refers to an important instrument for effectively and efficiently engineering business process as well as, implementing and evolving supporting systems (Ross, 2005; GAO 2003).

Enterprise Architecture can help organizations and their transforming processes to execute their strategy. Successful enterprise architecture provides benefits for enterprise. Those benefits may relate to decreased cost, increased revenues expand business opportunities and improved processes. In another hand, bad enterprise architecture can jeopardize the entire enterprise. Examples of such consequences are: high expenses, technical chaos and diminished executive creditability (OP't Land et al, 2009; Sessions, 2006).

The concept of Enterprise Architectures goes back to the mid-1980s for the first time when IBM system journal published a title named "A framework for Information System Architecture" by J. A. Zachman. That was recognized as a leader to the field of EA, identified the need of EA by using a logical constructions. Soon after, it became blueprint for defining and controlling the integration of systems and their components. Later Zachman rename his information system's framework to be an Enterprise Architecture framework with the purpose of defining and capturing the concept of architecture. Later this framework was used for manufacturing industry in different work products. To name few work products we can mention architect plans, a contractor plans, shop plans, and bills and lading. After Zachman, several Enterprise Architectural frameworks were adopted from that work. Examples of those are: The Open Group Architectural Framework (TOGAF), Federal Enterprise Architecture (FEA), and Gartner group which are the most well known in the Enterprise Architecture field (Session, 2006, 2007).

3.2.1 Definitions of Enterprise Architecture

The definition of the Enterprise Architecture may differ from different architectural perspective; some definitions are:

Wikipedia's definition for the Enterprise Architecture is: *"An Enterprise architecture (EA) is a rigorous description of the structure of an Enterprise, which comprises enterprise components (business entities), the externally visible properties of those components, and the relationships (e.g. the behavior) between them. EA describes the terminology, the composition of enterprise components, and their relationships with the external environment, and the guiding principles for the requirement (analysis), design, and evolution of an enterprise. This description is comprehensive, including enterprise goals, business process, roles, organizational structures, organizational behaviors, business information, software applications and computer systems"*(Wikipedia, 2011).

The Open Group's Architectural Framework (TOGAF) defines architecture as:
" Architecture has two meanings depending upon its contextual usage: (1) A formal description of a system, or a detailed plan of the system at component level to guide its

implementation; (2) The structure of components, their interrelationships, and the principles and guidelines governing their design and evaluation over times. The definition of enterprise in the context of enterprise architecture can be used to donate both an entire enterprise, encompassing all of its information systems, and a specific domain within the enterprise. In both cases, the architecture crosses multiple systems, and multiple functional groups within the enterprise" (TOGAF, 2007).

According to Zachman (1987) *"The Enterprise Architecture framework as it applies to Enterprise is simply a logical structure for classifying and organizing the descriptive representation of an Enterprise that are significant to the management of the Enterprise as well as to the development of the Enterprise's systems".*

Federal Enterprise Architecture (FEA) simply defines Enterprise Architecture as *" blueprint for systematically and completely defining an organization's current (baseline) and desired (target) environment* (CIO Council, 2001).

According to Gartner Group, an Enterprise Architecture is" *The process of translating business vision and strategy into effective enterprise change by creating, communicating, and improving the key principles and models that describe the enterprise's future state and enable its evolution"* (Gartner, 2005).

3.2.2   The Sub-Architectural principles

Organizations are interested in taking control and over viewing of business processes and the matters, and of how applied Information Technology could effectively support company's goals and visions, is what organizations are after. Moreover organizations realize the strategic tool of "Architecture" is needed in order to handle the complexity of the strategic business development (Aerts et al, 2004). Rood, (1994) defines Enterprise Architecture and it's reflection on the primary components of enterprise via frameworks and exposit, and how the components either interact or relate to each other. Dividing enterprise architecture into different categories and domains is common within architectural frameworks. According to Hugoson et al (2008), these categorizations help enterprise to distinguish between different types of questions and facilitate relevant information.

The TOGAF frameworks divided architecture in four different sub-architectures: Business architecture, data architecture, application architecture and technology architecture (TOGAF, version 8.1.1). With respect to this categorization, there are some semantic changes observed in today's architectural frameworks: 1) data architecture replaced by the term "information architecture" 2) data architecture and application architecture as whole concept of "Information system architecture", and 3) technology architecture replaced by the term "IT architecture". Therefore according to Pessi (2010), the new categorization of architectural frameworks includes: Business architecture, Information System architecture and IT architecture (figure1).
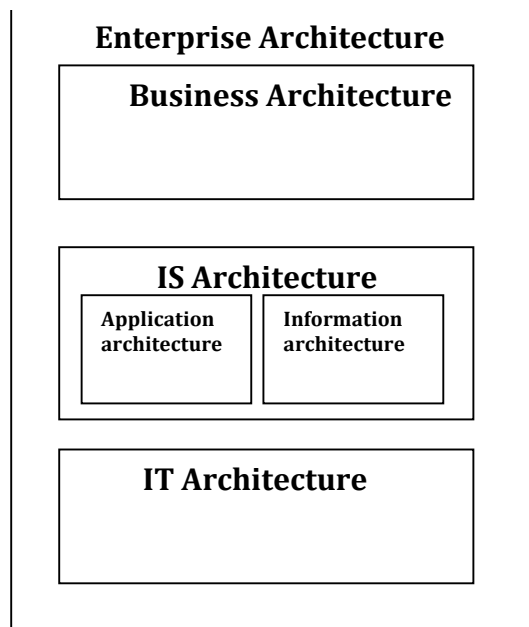
Figure (1), Enterprise Architecture's domains (Pessi, 2010)

The Business Architecture was defined as a business system in its environment of customers and suppliers. It derived from the business vision, strategies, goals, governance, organization and key business process. The systems include business process, rules, human and resources/ Information communication technology that count as disciplines of industrial engineering and management science. Business architecture provides the much-needed link to business strategy and the other major components of architecture (Aerts et al 2004; Ganesan and Paturi, 2008).

Information System architecture refers to the combination of both application architecture and information architecture (Pessi, 2010). According to the author, the information system architecture details the IS components of business and their interactions. Zachman (1987) defined information systems architecture as a representation the sum total of all information related flows, functions, structures and others in both manual and automated ways, which are in place or required to support the relationship between the units, which makes up the business. Those constructed elements of IS architecture presented separately as follows:

Information architecture refers to a link between business architecture and those applications, which need for businesses. The aim of this form of architecture is to gather the needed information. According to Pessi and Magoulas (1998) information architecture should not be based on the technology that company applies, because the company's technology often changes and replaced. Information resources are much more permanent than technology itself and thus it is important to separate these two concepts. The authors also mentioned that in business architecture level, the structure and routines could change without that the information itself being affected. The usage of those sub-architectures may vary from one organization to another; this can be said that large organizations mostly use business architecture and they are mostly toward business-oriented approach while the small organization applies information architecture more often (Roeleven and Broer, 2009).

Application architecture describes the essential needed applications for managing the information. It has supporting role towards the business functions. One important aspect within this domain is that organization strives after de-coupling applications from each other and from information resources. According Pessi and Magoulas (1998), data should share on information level instead of exchanging messages on application level. Aerts et al (2004) describe that application architecture details the software application components and their

interactions. The authors also mentioned that its details could be explained using object or component models or application frameworks that belongs to the disciplines of computer science.

The IT Architecture describes the technology and platform, which needed for realizing and managing of information and application architectures. As it was mentioned earlier technology is changing frequently and it's preferable that the other sub-architectures not be affected by those changes (Pessi and Magoulas, 1998). In recent years, the technical architecture replaced by the term IT architecture (Pessi, 2010). Aerts et al (2004) refer to technical architecture as Information Communication Technology (ICT) platform architecture. The authors mentioned that this architecture refer to the generic resource layer that describes different elements. To name a few, computers, networks, operating systems, data management systems, and etc can be mentioned. These elements can be applied as a platform for the construction of an enterprise's system. According to Aerts et al (2004), this domain belongs to the disciplines of computer systems engineering.

3.3 Alignment

During last decades, the IT Management's vocabulary has been expanded drastically. The new terms and vocabulary have routed in military history. As examples of those terms Alberts and Hayes (2006) refer to the words "Strategy" and "alignment". Strategy originated for planning of warfare while alignment originated to describe a line of things arranged in so called military line. Reviewing in management articles, it is clearly visible that the word strategy applies increasingly. Strategic IT management, business Strategy, IT/IS strategy and many other strategic terms are the examples of those evolutions (Ward and Peppard, 2002; Henderson and Venkatraman, 1996; Pessi and Magoulas, 1998; Hugoson et al, 2008). In this sense, the alignment is not an exempt. In recent years the term alignment has increasingly replaced by the term" Strategic alignmnet" (Henderson and Venkatraman, 1996; Luftman, 2000; Magoulas et al, 2011; Pessi and Magoulas, 1998; Hugoson et al, 2008).

Merriam Webster online dictionary defines Alignment as follows:

1) The act of aligning or state of being aligned; *especially*: the proper positioning or state of adjustment of parts (as of a mechanical or electronic device) in
relation to each other
2) a: a forming in line**, b:** the line thus formed
3)the ground plan (as of a railroad or highway) in distinction from the profile
4) an arrangement of groups or forces in relation to one another new *alignments* within the political party

The concept of strategic alignment has been expressed in several terms. As a result, Avison et al referred to several authors (see Avison et al, 2004) and gathered those synonyms. Those are: fit, integration, bridge, harmony, fusion and linkage. Moreover Magoulas et al (2011) added more synonyms as conformity, compatibility, relationship and balance. Avison et al (2004), pointed out that regardless of which word is preferred, they all share on aspect, which is integrating of strategies to the businesses and its IT/IS.

Alignment is a top management concern, yet no comprehensive model of the construct is commonly used; this may relate to the lack of commonality to the views of alignment's

approach. From two main perspectives, the strategic alignment may be approached and those are: process perspective and outcome perspective (Avison et al, 2004). According to the authors, process research contains investigating planning activities while outcome research involves realized strategies. Depending of what perspective researchers have towards alignment, their domains of focus may differ. They either focus on actors, values, communication and understanding or examine strategies, structures and planning methods. Reich and Benbasat (2000) stated that "alignment is the degree to which the IT mission, objectives and plane support and are supported by the business mission, objectives and plans, it's a outcome and its determinates are processes".

Luftman (1997) consider alignment as a process. "Alignment is about what management does to achieve its IT goals. Alignment concerns "the use of management process and assessment tool that can help to promote long term IT-business strategic alignment. Later he discussed that strategic alignment should focuses on the activities that management perform to achieve both IT goals and other functional organization such as finance, marketing, human resource and manufacturing. In another term, the author mentioned "alignment addresses both how IT is in harmony with the business, and how the business should, or could be in harmony with IT " and that should happen in harmony with business strategy, goal and needs in timely matter (Luftman, 2000). He mentioned alignment has inhibitors and enablers. The enablers for alignment are leadership from IT department (make sure that IT department prioritizes workload in right way, and the enterprise resource are shared), executive support or IT and sharing development in order. While the inhibitors refer to the occasion in which organizations don't have not integrated relation between IT department and businesses, workload distributed poorly from IT department, lack of commitment, little executive support for IT and not knowing the customers (Avison et al, 2004).

Henderson and Venkatraman (1999) define the need for having alignment between business and IT, which they describe it in their model as Strategic Alignment Model (SAM). The model defines alignment perspective between four main domains of business and IT strategy, organizational infrastructure and processes, and IS infrastructure and processes. Each domain, have constitute components as scope, competencies and governance at external level and infrastructure, skills and process at internal level. According to the author, Strategic alignment model based on building blocks, which covers two strategic areas that are strategic management and strategic fit (see figure 2, page 18).

Ciborra (2000) was among the authors who criticized strategic alignment model. One of his concerns was that strategic alignment model created to respond the questions of "*what*" to do in order to extract the maximum IT capability from corporate infrastructure and "*how*" to corporate infrastructure are developed and applies in practice while in reality those concept seems to be unreachable.

 Ciborra referred to Alignment as a conceptual bridge, which urges us to reflect on the true nature of management strategy and technology. He clearly stated that leadership and technology are the concepts, which has been taken for granted. According to the author, researchers believe more in geometric representation (creating abstract concepts in models) than in ethnographical research. Ciborra (2000) clearly stated that "*despite the research discovery and their translation into new management models, the news from the field has constantly been that alignment is not easy to implement, awareness does not sufficient, and the two main poles of alignment, strategy and technology, are actually drifting apart for one reason*

to another". He defined his statement, mentioned that, flexibility and uncertainty are questionable in structured strategy process. They are predominated while the articulation of the strategic intent is not an easy task (Ciborra, 1997).

For responding to those objections, Luftman (2000) mentioned that achieving alignment is extremely difficult because it s evolutionary and dynamic. Theses tasks require strong support from senior management, strong relationship, good working relations, trust, communication and full understanding of business and technical environment. The author also mentioned that achieving and preserving alignment requires focusing on maximizing enablers and minimizing inhibitors. This is what Aerts et al (2004) referred to it as balancing the mutual influences between domains.

Magoulas et al (2011) referred to the concept of alignment as a harmonious relationship between two areas of interests in general and the whole enterprise as particular. Reflecting the importance of alignment between Business and IT domains, Magoulas et al (2006) represented the model called, The Framework for Understanding Enterprise Architecture that focuses on five basic domains of interests. Those areas are Information Communication Technology, Organization's structure, Organization's process, Organization's culture, goal and evaluations and stakeholders; however lately Magoulas et al (2011) renamed those domains as the area of stockholders and their responsibility, the area of enterprise activities and management, the area of decisional rights and responsibility, the area of enterprise goal, objectives and values and the area of information system and information communication technology resources. Respect those domains; the authors consider five alignments domains, which are Infological alignment, Socio-structural alignment, Functional alignment, Socio-cultural alignment and Contextual alignment (see figure 4, page 22).

The lack of communality for alignment may also refer to the matter of what organizations perceptive is from the business value from the IT (Avison et al, 2004). The authors mentioned that in unfocussed organization there have not seen clear goal for IT and therefore executives are indifferent towards it. In such organization, IT views as expense, so managements delays IT purchase and this cause miss manage or undermanage the IT investments area. While in operation-focused organization, the aim concerns the operational effectiveness of IT as reducing operating costs and increasing efficiency. In market-focused organization, IT applies to intensify strategic positioning via creating or improving value for customers and at the end the authors referred to dual- focused organization, which they improve operational effectiveness and strategic positioning simultaneously by market reach and new market creation. Tallon et al (2000) mentioned that although the sign of alignment is observed on each focused –base organizations, but the levels of strategic alignments differ from one organization to another, i.e. executives with more focused on goals for IT perceive higher levels of alignment, and higher level of strategic alignment accompanies with higher perceived level of IT business value.

Strategic alignment influences IT effectiveness in positive way and leading organization to gain profitability. It assist organization in three ways: 1) by maximizing return on IT investment, 2) by helping to reach competitive advantages through IS and 3) by providing direction and flexibility to achieve new opportunities. However, it argued that failure to leverage IT, might seriously strangle organization's performance and viability (Avison et al, 2004). As conclusion for the alignment, the authors mentioned that alignment between IT and business and their strategies are necessary for enterprise to be successful or be competitive.

3.3.1 Strategic Alignment Model

Strategic Alignment Model (SAM) created by Henderson and Venkatraman (1993) to address the alignment between business and information technology within an organisations. According to the authors, the role of information technology (IT) has changed to from its traditional way to strategic role. This means, that it should not only support the chosen business strategy but also shape new business strategies. SAM defined four fundamental domains as: Business strategy, IT strategy, Organizational infrastructure and processes and IT infrastructure and processes. According to SAM, the Business strategy and IT strategy are considered as external components, while the two remaining parts consider as internal components (figure 2). The relation and inter-relation of those criteria are important tasks that relate to strategic management.
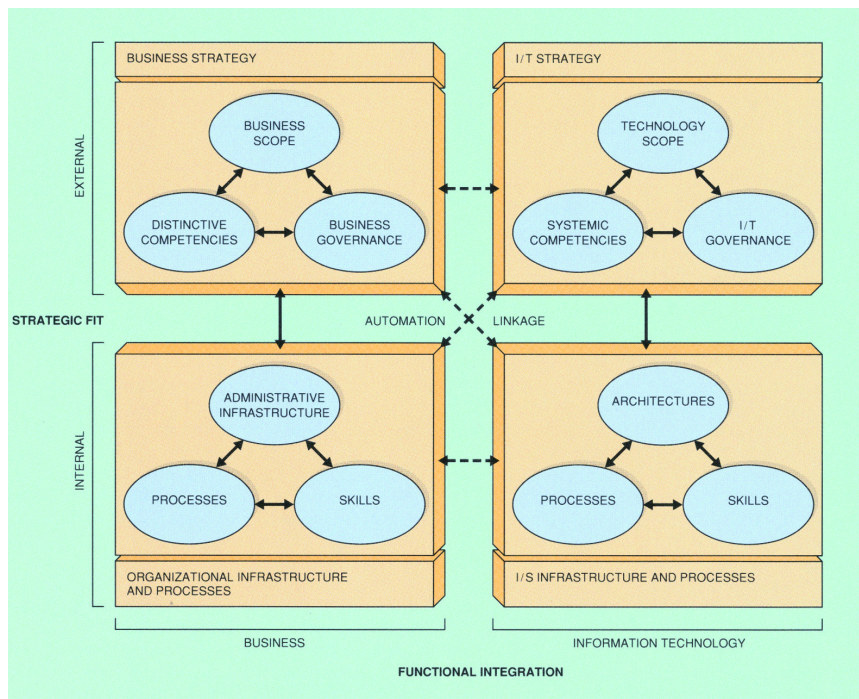

 Figure (2), Strategic Alignment Model, Henderson and Venkatraman (1993)

According to Henderson and Venkatraman, Strategic Alignment model has been defined with the consideration of minimum four areas as: Business Strategy, IT Strategy, Organizational Infrastructure and processes and IS Infrastructure and Processes. **Business strategy** considers the areas of Business scope, Business Governance and distinctive competencies. In other hand, **IT strategy** defines the three main areas as Technology scope, system competence and I/T Governance. The authors considered those mentioned area as External part in Strategic Alignment model. **The Organizational Infrastructure and processes** consider three parts of administrative infrastructure, processes and skills, while **the IS infrastructure and processes** consider same criteria but in respect to an IT perspective. According to authors, the last mentioned areas refer to Internal part in Strategic Alignment Model.

In general term, Henderson & Venkatraman referred to **internal domains** as a select of pertaining the logic of the administrative structure, the particular rationale for design and redesign of critical business process. In the same concept, the achievement and development of the human resource skills is required for obtaining the necessary

organisational competence. As an example of those mentioned areas, the authors refer to product delivery, product development, customer service, total quality or in the area of administrative structure such as functional, divisional or matrix organisation.

Henderson & Venkatraman refer the **external domains** as an area, which the organisation competes and it concerns with decision of offering product-market etc. This may refer to the distinctive strategy attribute such as differentiated from other firm's competitors, choosing partnership and also the alliance concept.

As a characteristic of strategic management, Strategic Alignment Model has been based on two building blocks, which are **strategic fit** and **functional integration**. According to the authors, **strategic fit** refers to interrelationships between external and internal components. Henderson & Venkatraman clearly stated that the inadequate fit between external and internal domains of I/T is a main reason for the failure to derive benefits from I/T investments. However, Jarvenpaa and Ives (1994) argued that too closed fit between IS and business strategy can cause reducing strategic flexibility. In this respect, Ciborra used the term" right fit" and mentioned that by finding right fit between external positioning and internal arrangements, the economic performance may raise by alignment (Ciborra, 1997).

Another dimension of Strategic Alignment Model refers to the **Functional integration**, which relates to the integration between business and functional domains. According to the authors, the need for having integration between Business and IT domains has been discovered for a while though the areas of their focus may vary from one company to another. SAM defines the need of two types of integration between business and I/T domains: **Strategic integration** and **Operational integration**. The **strategic integration** considers the integration between business strategy and I/T strategy, which would reflect the external domains. It deals with the capability of I/T functionality and the aim is to both supporting and shaping the business strategy. **The operational integration** deals with the corresponding the internal domains. It acts as a link between organizational infrastructure and processes and I/S infrastructure and processes, making sure those organizational requirements and expectations meet the delivery capability with the I/S function.

Henderson and Venkatraman considered the alignment's domain in four perspectives, which in two perspectives the driver is business strategy (strategy execution and Technology transformation) and the two others, the driver is I/T strategy (Competitive potential and Service level). In **Strategy execution**, business strategy refers as driving force for both organizational infrastructure and I/S infrastructure. While in **Technology transformation**, business strategy uses as a driver for I/T strategy and I/S infrastructure. In **Competitive potential**, the I/T strategy will be used as a driver for both business strategy and organizational infrastructure. And finally in **Service level**, the I/T strategy applies as a driver for IS infrastructure and organizational infrastructure. In those perspectives, the author mentioned the aspects of management area, by representing the role of top management, I/S management and performance criteria (figure 3).

	Role of top management	Role of I/S management	Performance criteria
Strategy execution	Strategy formulator	Strategy implementers	Cost/service centre
Technology transformation	Technology visionary	Technology architect	Technology leadership
Competitive potential	Business visionary	Catalyst	Business Leadership
Service level	Prioritizing	Executive leadership	Customer satisfaction

Figure (3), four different alignment perspectives, management and their criteria adopted from Henderson and Venkatraman (1993)

Strategy execution alignment perspective is the most common and understandable one in classical and hierarchical view of strategic management. The authors referred to the role of the top management as strategy formulator, while they mentioned the role of I/S management as strategy implementer. They also mentioned that the I/S function within this perspective is based on financial parameters that reflects a cost centre focus. Meanwhile, Technology transformation considers the role of top management as technology visionary and the role of I/S management as technology architect. The authors also mentioned that the performance criteria in this perspective are based on technology leadership which often utilizing a benchmarking approach to assess the position of an organisation in the I/T marketplace (Henderson and Venkatraman, 1993).

In Competitive potential, the role of the top management has viewed in business visionary who articulate between IT competences, functionality, changing governance pattern in IT marketplace and the impact on business strategy. The role of I/S management is one of the catalysts which refer to who recognizes and interprets IT environment for assisting the business managers for understanding the potential opportunities and threats from an IT perspective. According to the authors, the performance criteria in mentioned alignment perspective are based on business leadership. And the last perspective namely service level, focuses on how to build a world-class IS service organisation. The authors refer to the role of top management as prioritizing that whom can articulates and decide the best to allocate the scare resources in both within the organization and in IT marketplaces. They also refer to the role of IS manager as the one who is executive leadership who would make the internal services businesses succeed within the operating guideline from top management. The performance criteria in this perspective are based on customer satisfaction (Henderson and Venkatraman, 1993)

 Henderson and Venkatraman (1993) concluded that there is no single perspective, which is superior to the others, but rather it is important to consider alternative choices, which matches to the organisations situation. The authors clearly mentioned that the strategic alignment is a process and not an event and therefore it requires an understanding of its dynamic's nature. The authors emphasised that the potential for IT impact is much complex and varied from one situation to another and therefore, the executives must pay attention to that as "alternative conceptual lenses" and to be ready for continuous learning and adoptions.

3.3.2 The Framework for Understanding Enterprise Morphology (FEM)

Organizations constantly find themselves in changing situation. Those changes may refer to producing more effective production (business change), education of personal (competence development), and/ or developing a new IT-system (System development). If an IT-project and its results meet those criteria, it will promote a successful integration and thus the promotion of an integrated development (Svärdström et al, 2006).

The authors referred to the meaning of developing as a process which must be defined, planned, implant, evaluate and etc. For that reason, they developed a model named FEM Model (The Framework for Understanding Enterprise Morphology), which focuses on business state and potential changes. It also deals with the definition of substantial relations such as technological alignment, structural alignment, process-oriented alignment, knowledge and competence alignment; goal- oriented alignment etc.

FEM model represent a baseline for defining small and big organizations out from morphological perspective. It focus and illuminate organizational pattern in different paths such as hierarchy versus networked organizations, individual-based versus team-based organizations, sequential versus parallel processes, rule-based versus goal-based traded, etc. According to the authors, introduction of information technology and information system in organizations affects those mentioned patterns.

They defined those patterns as a result of existing correlations, which can explain in terms of interaction between people and/or organizations. The stronger the correlations that exist between them, the greater are the need for coordination of development process. Magoulas et al (2011) mentioned that an IT- based business developing enterprise influences by four different areas as: the area of stakeholders and their responsibilities, the area of enterprise activities and management, the area of decisional right and responsibility and the area of enterprise goals objectives and values. According to the authors, these resources together with information system and information communication technology (ICT) define as information infrastructure of an enterprises (figure 4).

Those domains are considered as constructive parts within the FEM model while IS and ICT are considered as a central concept of the model. In FEM model, the focus is to observe the relations between IS/IT and the other constructive parts and thus those relation will represents five different relation areas as Infological alignment, Socio-culture alignment, Functional alignment, Socio-cultural alignment and Contextual alignment (Svärdström et al, 2006; Magoulas et al, 2011).

According to the authors, achieving successful integration among Structural, Info-logical, Functional, and Cultural together with IS/IT will create a good foundation for a coordinated business development.
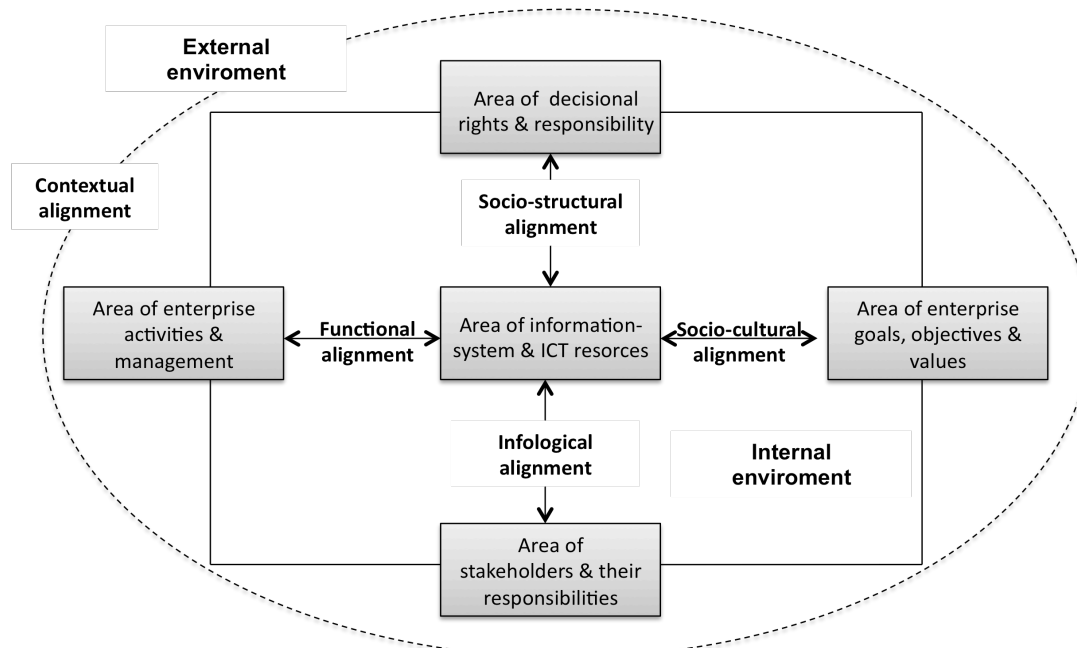
Figure (4), FEM model, Magoulas et al (2011)

The area of Stakeholders and their responsibilities

The emphases on the importance roles of an organization's stakeholders have been referred to them as backbone of an organization (Svärdström et al, 2006). According to Pessi and Magoulas (1998), stakeholders should be identified before any investing in IT developing process. Depending of what they perform and what they have as an interest within an organization, their role may differ from each other. Identifying stakeholders and their involvement in business developing of an enterprise is an important task specially when a development project is going to be implemented. Stockholders are divided into internal and external. Examples of internal stakeholders, which can effect or be affected by business change, are: Leaders, users, members and investors. Customers, suppliers, trade union and public authority with their laws and regulations are considered as external stakeholders.

Stakeholders around an IT-system have different interests. They can effect or be affected by an IT-system in varied extent. Regarding the connection between the IS/IT and stakeholders, one concern may refer to stakeholder's competence and another will relate to the different demands and expectations, which stakeholders have from an IT developing project.

Stakeholder's knowledge and competence counts as important factors in business change, in fact their competencies, sustain the flexibility required in dynamic environment (CEO, 1997). Magoulas et al (2011) mentioned that not only the stakeholders are source of knowledge and experiences but also they can cause conflict due to their individuality. To solve this problem, their knowledge and competences shall utilize in designing of an IT-system through specialized training. Also, they should be able to handle the complexity of new changes with an appropriate educational plan.

The author mentioned that as much as the stockholders are varied, their demands and expectations are different regarding how information should be distributed in IT developing task. Those demands may either base on their requirements or on their preferences. Hedberg (1980) mentioned that what ever those demand have been based on, it should (in maximum

possible extent) meet via negotiation between the participants of an organization. This is what Magoulas et al (2011) referred to it as collaboration, commitment and communication between involving parties.

The area of decisional right and responsibility
This domain, in general terms refer to the structure of all fundamental policies such as categorizing job, steering, decision making, rule setting, fixing routines, monitoring and guiding corporative work etc. Those tasks are reflecting organizational culture and values; lead them to realized their goal and ultimately direct them for business change (Svärdström et al 2006; Magoulas et al 2011, Cameron, 2003).

Svärdström et al (2006) referred to this domain as organization structure with the aim of obtaining certain level of regularity and predictability in behavior that is shown by different individuals within an organization. As an advantage of those Svärdström et al refer to the fact that through organizations structure, origination achieves stability in their behavior. It shows that organizations are coordinated according to people's behavior. By setting rules, procedures, reward systems and formal structures, it seems that coordination in organized teamwork and team support

Structure designates the tasks and responsibilities that addressed both individual and groups within an enterprise, and the design of the systems to secure effective integration and communication efforts. This indicates that organization structure and internal systems facilitate communication and interaction needed for control and coordination of organizational activities. In other word, if organization and structure system is designed in a way that provide correct, sufficient and suitable richness of information, it may reduce uncertainty (Daft and Lengel, 2006).

Pessi and Magoulas (1998) referred to organizations' structure as legal responsibility against society and they saw it as a rational way to see through an organization. According to Svärdström et al (2006) the aim for having organizations structure is to obtain certainty. Formal organizations structure constitutes consciously to promote certain level of behavior and also to coordinate this behavior with a view to resolving specific task within an organization. According to Svärdström et al (2006), the formal organizations structure has two main dimensions: Dimension one would refer to the division of labor and specialization, which either can limit the employee's freedom to work or on the contrary, gives them broad discretion to decide over their work and Dimension two relate to the Management and coordination of work that can bring limits for execution of tasks or contrary delegate power to the employees to individuals to decide how their work will be performed. At any dimensions at the time, Structure should meet expectations from society and satisfy systematic desirability (Checkland, 1981; Hedberg, 1980).

The area of enterprise activities and management
This area also defined as "process" is considered the procedures of design, which in most cases refer to adding values to an organization. This task may involve production and services in developing or changing situation i.e. convert different sorts of input to determined output in forms of product or service (Magoulas et al, 2011; Szegheo and Andersen, 1999).

Machines, human or a combination of both performs different actions, which furthermore can create a process. Organization process includes processes, activities, conditions, events and organizational units. Examples of organizational unites can be sales, material procurement, logistic, production, marketing etc as well as the coordination and administration of those tasks. Organizational process in many ways can contribute as a function of the structural, managerial and cultural factors (Szegheo and Andersen, 1999; Svärdström et al 2006; Miller, 1993).

Information technology in different forms and in large extent uses for managing, supporting or controlling of different processes and activities within an organization. In one hand, IT system should reflect business and make secure that IT system integrates within an organisation and in another hand, it should be matched to all processes and activities in a way that reduces uncertainty. In order to achieve effectiveness and monitoring the work process, the IT usage plays an important role but at the same time, the competence for developing the system should also be supportive. (Hugoson, 1989, 1990; Svärdström et al, 2006; Daft and Lengel, 1986).

Svärdström et al (2006) stated that the goal is often to make an optimal performed process, which consumes time and dedicated resources to the maximum. When an IT system design for supporting one or more processes, it's important that the processes are identified and evaluated in advanced. This will help to avoid of building an IT systems process that is inefficient.

The area of enterprise goals, objectives and values
Svärdström et al considered this area as "organizations culture" which deals with organization's basic assumption and views namely vision, belief, values, mission, norm, principles as well as their long term and long term expectations. A culture provides identity for organization's member and outside. It may also include organizations perception, thinking and acting towards problem or towards obtaining organizational goal (Miller, 1993; Svärdström et al, 2006).

According to Pessi &Magoulas (1998) organizations culture shows also their social responsibility towards employees and they refer to it as an emotional way for look through an organization. In one hand the informal behaviors such as personal and social relations within an organization affect on employees behavior (organizations culture) and in another way organizational structure is used for controlling the social behaviors at its best therefore the social organization should not only concern profitability but also should struggle to create a favorable environment for organizations member that works towards collective goals (Magoulas et al, 2011).

As a goal and respecting to organizations culture, organizations' structures have some main tasks as follows: It concern matters such as how organizations members realize and interpret the goal and guide principles for their work and how they prioritize between different tasks. It also concerns issues of how the members concrete acting in solution of those tasks (Svärdström et al 2006).

According to Svärdström et al (2006), organizations-culture can serve as a management tool if employees socialize in an organizations culture. This will lead them automatically to become engage in organizations interests. According to Lundvall et al (2006) the idol

culture refers to those organizations whose employees satisfy and fulfill both their own goal and the organizations goals.

The area of Information System and ICT resources
This area is a central part of FEM Model which connects IS and ICT with business. It connecting those different dimensions and supplies them with relevant information and, therefore should be supportive for stakeholder's information needs, processes etc. It should consolidate the social structure development as well. System environment includes both existing and planned IT-system and also the relation between them. When an IT-system develops, it should adopt the existing IT- system and those, which are in planning stage (Magoulas et al, 2011; Svärdström et al, 2006).

Svärdström et al (2006) referred to this domain, as system-developing environment, which is understood better via that so-called information system architecture. Magoulas et al (2011) mentioned that IS architecture defines those systems, which provide organization with information and services and could be rational, informative, innovative, decisional or transactional in its nature.

Svärdström et al (2006) also referred to the concept of architecture with aim of addressing the questions of: what, who, why, where and when; such as: Which types of information need for the system and who needs that information? Why and in what reason this information gathers, stored and inspected? And where and when is the right time for delivering that information to recipients?

According to Magoulas et al (2011) this area covers many activities such as modeling, project planning, project management, architectural design and simulation.

The alignment between constructed elements of FEM model:
 There are five alignment pattern is considered within FEM model. They are Infological alignment, Socio-cultural alignment (the soft part of the architecture), Socio-structural alignment, functional (the hard part of architecture), and contextual alignment (Svärdström et al, 2006; Magoulas et al 2011).

Shortly, the Infological alignment reflects the interaction between the two areas of IS and ICT resources together with stakeholders and their responsibilities while Socio-cultural alignment illustrate the relation of two areas of IS and ICT resources and enterprise goals, objectives and values.

The Socio-structural alignment refer to the relation between the area of IS and ICT resources and the area of decisional right and responsibility while Functional alignment considers the relation of two areas of IS and ICT resources and enterprise activities and finally the Contextual alignment reflect the interaction between business domain together with IS and its environment.

Infological alignment:
The interaction between the information system and ICT resources together with the area of stockholders and their responsibilities refer to the Infological alignment, in another term, this alignment reflects the harmonious relationship between IS and individual

stakeholders. Respect the Infological alignment, creating actuality and achieve common understanding are among important tasks (Magoulas et al, 2011; Svärdström et al, 2006).

According to Svärdström et al (2006), creating actuality happens when the system leave the correct information and store the right information in an appropriate place. Magoulas et al (2011) mentioned that not all kinds of information could universally being communicated and it should be established via negotiations. Meanwhile, IS should have supporting role towards learning processes and therefore according to the authors, in dynamic environment, the standard operating procedure should be avoided in its maximum extent.

Beside those mentioned facts, all stakeholders must have a common ground for to using the system in a right way. Moreover, the characteristic of information may refer to the knowledge that communicated via human's languages (Langefors, 1975, 1986) and therefore using one language that understood by all organizations members is an important task. This is what Svärdström et al (2006) referred to it as perceiving common understanding.

As conclusion Magoulas et al (2011) mentioned that, locality, comprehensibility, meaningfulness are essential items needed in Infological alignment, while communicative style, decision style, working style, cognitive style and perspectives are among factors which significantly important for stakeholders who willing to use and accept the information systems. The authors mentioned that not only above factors are required but also extra information needed to fulfill the Infological alignment. According to the authors, this alignment cab be displayed by this equation:

Required information=provided information +extra information

Socio-structural alignment:
According to Magoulas et al (2011), Socio-structural alignment refers to harmonious relationships between the structure of power and information systems i.e. the interaction between the area of IS, ICT and the area of decisional rights and responsibilities.

Svärdström et al (2006) mentioned that in the quality of focused areas depends on the matter of responsibility and ownership. The author's emphasis that the involvement of participant and their acceptance towards changing organization's structure should considered as an important task. They also stressed the fact that in order to gain positive effect in developing work, all involved stakeholders should be willing the upcoming changes.

In the contrary, if the involving stakeholders feel that they don't have responsibility, it will lead organization to an unwanted corporation, which in worse case led sabotage within an organization. As a conclusion, Magoulas et al (2011) mentioned that the Information structure should be clear, comprehensive and simple in order to be managed. They showed this alignment in following equation:

Established Socio-structure= accepted Socio-structure

Functional alignments:
Magoulas et al (2011) mentioned that functional alignment is the state of harmonious relationships involved the area of information systems and the area of activities and processes. The functional alignment is largely depends on the information on the system. Flowing incorrect information in system can lead organization to make the decision on fault bases. The authors mentioned that not only information should be relevant and applicable but also the processes, must create, value for businesses and its stakeholders in timely manner.

Magoulas et al (2011) stated that systems could perform informational activities, which may see as a non-separated part of organization's activity. Respect functional alignment, this means that the quality of IS depends on the quality of enterprise process and vice versa. Functional alignment deals with the issues of developing IS respect enterprise process and therefore it should be based on process effectiveness, flexibility, quality improvement, support, inter dependency, degree of required synchronization and economy and degree of coordination. However, judging and evaluating of the quality of functional alignment could be hard task and this may be due to the fact that the values and the meaning of good quality differ from one actor to another. According to the authors, this alignment can be shown as follow:

Required information capabilities (Time)= Available information capabilities (Time)

Socio-cultural alignment:
Socio-cultural alignment refers to the reflection of the harmonious nature of relationships between the area of IS and the areas of IS and the areas of goal, values, objectives and culture (Magoulas et al 2011).

The important fact within this domain is the matter of how shared values; collaborative behavior and mutual goal commitment are addressed within an organization (Magoulas et al, 2011). Svärdström et al (2006) refer to stakeholders as profitable factors who promote organization if they motivate in their working environment. According to the authors, another scenario may refer to unmotivated personal that can causes for preventing business developing work. Meanwhile the workload distribution should be considered in a way that no participant gets too much workload. Furthermore, the authors mentioned that checking to see if involving parties have enough competence and willing to corporate in developing work is among the task that managers should consider.

As general perspective, Socio-cultural alignment would address those following terms within enterprise: Social feasibility, codetermination, shared vision and goals, shared values and priories and commitment (Magoulas et al, 2011). The authors defined this alignment as following equation:

Stakeholders Expectation (Time) =Delivered contributions (Time)

Contextual alignment:

The contextual alignment refers to the harmonious relationship between enterprise as whole and IS and its external environment (Magoulas et al, 2011). The business domains are not the only areas of effects; they can affect and be affected by IS and via each other as well. Yet, the impacts are only indirect and invisible. However, that would be understandable through effects and its impacts on individuals, groups and the whole business behavior (Svärdström et al 2006). The authors have emphasized that the information flow impacts on all over organization and due to this fact, it is necessary to be conscious of all different impacted areas.

Magoulas et al (2011) referred to Tichy (1993) mentioning that contextual alignment concerns both enterprise boundaries and its interaction within its environment. The authors were skeptics towards the fact that organization can effect changes beyond the limits of organizations area, but they stated that one should be aware and conscious of the opportunities and barriers that usually accompany with any organizational changes. According to the authors, this alignment would be illustrated by this equation:

Expected enterprise behavior=Observed enterprise behavior

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4 STUDY OBJECTS

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This chapter discusses the frameworks of Zachman, TOGAF and FEAF. It discuss how those frameworks grounded, what perspectives and aims they have, what they contain and how those frameworks can help enterprise to fulfill their aims.

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4.1 Zachman

John Zachman was established enterprise architecture field (1987) with his publication of IBM System Journal namely "A Framework for information systems architecture. Later Zachman rename his framework to be an enterprise architecture framework. Today this framework is well known as "Zachman Framework", however many researcher refer his work as a taxonomy and not as framework (Sessions, 2006; Sowa and Zachman, 1992). After Zachman, many other well-known architectural frameworks such as The Open Group Architecture Framework (TOGAF), Federal Enterprise Architecture (FEA) and Gartner represented which have basically roots from Zachman' s work (Sessions 2007; Genesan and Paturi, 2008).

According Session (2007), Zachman is taxonomy which provides organizations artifacts such as design documents, models and specification that addressed who the artifacts target (business scope, business owner, builder, designer and sub-contractor) are as well as other particular issues such as data, function, network, people, time and motivation. Providing this taxonomy help organization to reach the concepts that have been explained in real world to the concepts, which describes in Information system and its implementation. Creation of this taxonomy is results of adaptation of many system analysts and database designers (Sowa and Zachman, 1992).

Zachman (1997) defines Enterprise Architecture as a *"set of architectural descriptive representation (i.e. models) that are relevant for describing an enterprise such that it can be produced to management's requirements (quality) and maintained over the period of its useful life (change)"* (ZIFA, PP. 6).

Zachman's taxonomy presented in a form of matrix, reflect 30 different perspectives of information systems. The matrix consists of two columns namely "perspectives" and " abstractions". The perspectives presents various aspects such as *the scope*, *owner, designer*, *builder* and *sub-contractor* while abstractions include the *what, how, where, who, when* and *why* product characteristics (figure, 5).

ENTERPRISE ARCHITECTURE - A FRAMEWORK ™

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

John A. Zachman, Zachman International

Figure (5), Zachman framework, (Zachman, 1996)

Five different perspectives of Zachman framework are describe as follows:

Scope (planner) is the first perspective in Zachman matrix, which supposes to reflect the shape, relations and basic purpose of the final structure. It also considers providing an overview to the planner or investors of the cost, functionality and size of the information system. Furthermore scope provides external requirement and drivers (Sowa and Zachman, 1992; Lundvall et al 2008).

Business model (owner) even named Enterprise model views enterprise from perspectives of owner. Policy and usage are two important constrains in this domain, which means dealing with both aesthetic and utilitarian in the conceptual view of the ultimate product (Sowa and Zachman, 1992). Lundvall et al (2008) mentioned that business model details the business processes and entities as well as their interactions and relations.

System model (designer) concerns enterprise from designer's perspective. Domains of constrain includes of structure and operation. In another term, "designers deals with the design constrain the law of physics or logical view of the end product". (Sowa and Zachman, 1992). The authors mentioned that the systems analysts who have the authority over the data elements, functions and whom that can represents the business units and processes, must design the system model.

Technology model (builder) reflecting the builder's perspective with the consideration of constrains such as tools, materials and technology. In order for builder that details the programming language, device, technology etc, they must adopt the information system model (Sowa and Zachman, 1992).

Out of context (subcontractor) practically specifies the details of subsections. Implementation is the only constrain in this domain. It represents individual, separated

components, which can be outsourced for further implementation (Sowa and Zachman, 1992; Lundvall et al 2008).

Zachman framework defines six abstractions as follow:

1-Data (what)– it covers all the entities that are involved. Data /or data modeling covers those areas, which related to businesses such as product/service and information elements (Sowa and Zachman, 1992; Genesan and Paturi, 2008).

2-Function (How) – define the functionality and involvement of the processes in business and sometimes calls as business process model. This procedure involves translating the goal of organization into detailed definitions of its operations. Regarding this abstraction, two attributes must be considered which are: business behavior and business functions. Business behavior relates to the alignment of business process for achieving goals and business function address the "virtual" and "idealized" enterprise within business (Sowa and Zachman, 1992; Genesan and Paturi, 2008).

3-Network (Where)– reflect the location of those functioning networks and business location i.e. physical and logical location of business are the areas of concerns here (Sowa and Zachman, 1992; Genesan and Paturi, 2008).

4-People (Who)– discuss who engage within work in the system. Those may refer to business role player (actor performing business behavior), business organization unit (the way that organization are structured and the interrelation) and business commitment (attaching of business with external and internal organization (Sowa and Zachman, 1992; Ganesan and Paturi, 2008).

5-Time (When)– reflect the question of "when". In other words it is, in terms of when those events occur. It describes business events over the specific period of time (Sowa and Zachman, 1992). Business events according to Ganesan and Paturi, (2008) affect business behavior therefore should take into consideration.

6-Motivation (Why)– refers to the reason (why) of activities happening. Those activities may relate to business objects and goals (translating of goal and strategy in to specific mean), business motivation (internal factors that motivate to establish business plan that are compatible with business situation) and, business situation (organizations culture, values and guiding principles).

As it described above, Zachman taxonomy covers six descriptive foci (data, function, network, people, time and motivation) and five players perspectives (planner, owner, designer, builder and subcontractor), however the interaction of those six questions with those five rows, creates 30 perspectives on an information systems, there after the first two row of Zachman mainly focuses on business and business architecture (Ganesan and Paturi, 2008; Lundvall et al, 2008).

Logic structure of the rules of frameworks are generic i.e. that can be mentioned as a strong advantage of Zachman framework. They can be used for structuring the description of any objects without considering prioritizing one element over another (Sowa and Zachman, 1992). Sessions (2007) referred to Zachman as taxonomy with sets of artifacts, which

guide organization "how" to categorize their artifacts. Another advantages would refer to the fact that most programming tools and techniques mainly focuses on one aspects or few related one but Zachman's focus areas are diverse i.e. by creating 30 different domains, it addresses how "everything" should fits together; however the difficulty shows when designers faced with the important question of "how" different columns and cells are relate to each other. This needs as "common language" describing all of the interacting components, connection and inter-relationship (Sowa and Zachman, 1993).

Another characteristic of Zachman framework is that each perspective reflects different sets of constrains. In other word, each box varies from other boxes and from different perspectives; as an example of those differences, one may notice that the meaning of "owner, designer and builder" differs from Data focus. However this aspect has both advantage and disadvantages also. Advantage is that Zachman framework provides vast varied range of artifacts that are unique (Zachman 1997) and disadvantages may refer to the lack of relationship between those perspectives, moreover in order to give complete view of architecture, all boxes required to be complete.

Session (2007) mentioned that although Zachman taxonomy provides large amount of information within an organization but is not provide "step-by-step" process for creating a new architecture and finally the author mentioned that it does not provide an approach to show the need for future architecture in an organization.

4.2 TOGAF

The Open Group Architecture Framework (TOGAF) – a Framework for Enterprise Architecture is an industry standard architecture framework, which refers to set of methods and tools for developing wide ranges of different IT architectures. The main concern in here is about enabling users for designing, evaluating and building an appropriate architecture for organization. It also applies for reducing the costs of planning, designing and implementing architecture based on open system solution (TOGAF, version 8.1.1). The TOGAF created (1994) and released its first publication on (1995). It based on the technical Architecture Framework for Information Management (TAFIM), developed by US Department of Defense (DoD) through lots of efforts and huge sum of financial investments (TOGAF, version 8.1.1). TOGAF divided architecture into four domains as: Business architecture, Data architecture, an application architecture and technical architecture (see figure 1, page 20); however from the beginning the purpose was just to develop the technical architecture and further lead for developing the methodology for analyzing the business architecture in overall terms.

TOGAF consists of three main parts: TOGAF Resource Base, The Enterprise continuum and the Architecture Development Method (ADM).

The TOGAF Resource Base considers a board range of resources such as guidelines, checklists, templates, processes and other important detailed material for supporting the ADM of TOGAF framework. Those materials are assisting the architect while they applying ADM (TOGAF, version 8.1.1).

The Enterprise Continuum define as a "framework –within- a- framework" that provide context for leveraging different architecture assets such as Foundation architectures, Common system architectures, Industry architectures and organizational architectures.

TOGAF views the enterprise architecture as a continuum of architecture, ranging from highly generic to highly specific i.e. the highly generic called for Foundation architectures and highly specific as organizational architectures. According to TOGAF (version 8.1.1) the Enterprise Continuum provides navigational help when discussion moves in between different levels of abstractions and facilitate the development of the architecture.
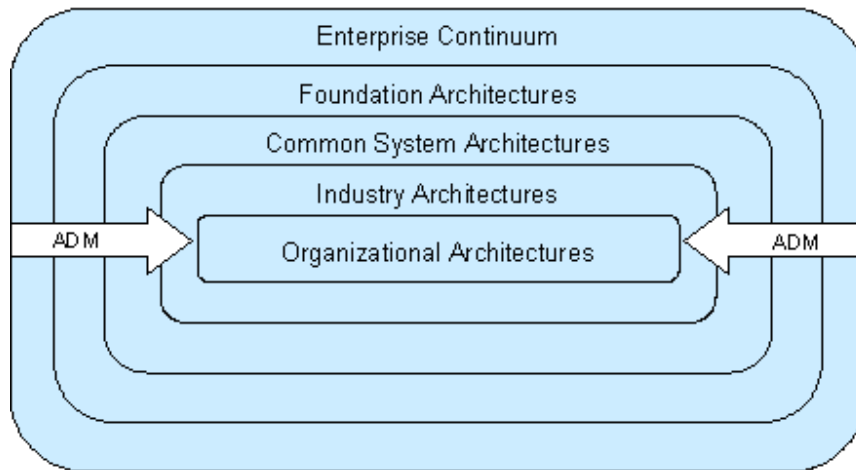

Figure (6), TOGAF Enterprise Continuum (Sessions, 2007)

Briefly, the **Foundation architectures** (most generic level) refer to those principles that can apply theoretically in any IT organization while **Common System architectures** refer to those principles that can use only in specific organization whereas **Industry architectures** is regarding to those principles which specific across many organization that have same domain of focus and finally **Organizational Architectures** (most specific level) refer to those architecture that tailored specifically to given organization.

According to TOGAF various models and standards can be categorized in very first generic level as Foundation Architectures. As an example we can mention about Technical reference model (TRM) and standards information base (STB). TRM provide alternative for description of a generic IT architecture whereas STB considers the collection of standards that needed to build IT architecture. Moving those mentioned abstraction levels from highly generic to highly specific are provided via The Architecture Development Method (ADM) namely "process" for driving movement.

The Architecture Development Method (ADM) according to the definition of TOGAF (version 8.1.1) is a key in this framework, which applies for developing enterprise architecture with the goal of meeting the business need. It forms the core of TOGAF through explaining how to derive an organization-specific enterprise architecture that address business requirements i.e. defining business needs, utilizing the elements of TOGAF (The Enterprise Continuum and Resource Base) and other available architectural assets to the organization. (ADM) consist of eight phases, those are: architecture vision, Business architecture, IS Architecture, Technology Architecture, Architecture change Management, implementation Governance, Migration Planning and Opportunities and Solutions (figure 7).
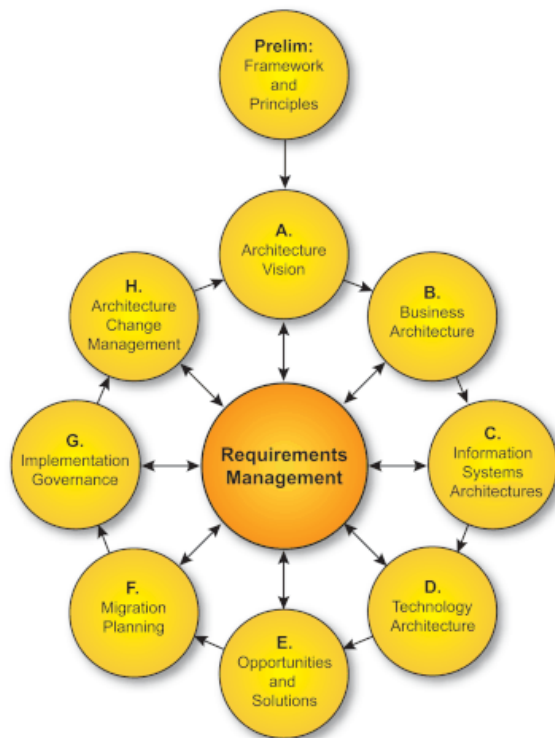
Figure (7) The TOGAF Architecture Development Method (ADM), TOGAF (version 8.1.1)

TOGAF ADM begins its work with what they call it *"Prelim"* refer to gathering necessary frameworks and principles. It includes documentation of many aspects such as: budgeting, business reason for the request, information and any other input that necessary for beginning the first phase. Those requests must be approved by involving stakeholders before beginning to start the first phase.

Architecture vision phase is the first step that would concern about how to create a vision. The task would start with the analysis of enterprise architecture project i.e. to make sure that all needed constrains are addressed. In this stage, business scenario can be used as well.

Business architecture phase concerns business modeling, technical documentation and detailed analysis of involving stakeholders. In this phase the current baseline architecture considered whereas target architecture is designed and the gap between those two discussed.

IS architecture phase is similar to previous phase but activities are towards IS. In this phase the type and sources of data need to be defined as well as create data model, which further will be compared with business architecture. This step is also secure if applications are match to business need. The data model modifies to application architecture and secure that it matches with business architecture.

Technology architecture phase applies those inputs that provided from previous three phases. In this phase, the baseline architecture is stated while the target architecture is designed. Opportunities and solutions phase consider as the evaluation phase, which

concerns with identifying implementation of the project, evaluating the possibilities for business in each every project.

Migration planning phase is the stage in which implementing of target architecture is providing. In this phase the contributing factors are overviewed (prioritizing of costs and analyzing risk factors) and make secure that all dependencies in the environment are at the place.

Implementation and governance phase defined as architecture of specifications for implementing project. This phase is deployment phase of the development project, which deals with administration of implementing of those projects.

Architecture change management phase refer to maintenance phase whereas a new baseline is created, new technology opportunities has been identified and changes in business environment occurs.

TOGAF ADM help organization with its recommendation sequences for each phases involved in developing in architecture i.e. describe "how to generate an enterprise architecture"(TOGAF, version, 8.1.1; Session 2007). Moreover ADM phases designed in a way that they can be combined, reshaped, skipped or leave uncompleted to fit the needs of the organization's situation (Session, 2007).

But TOGAF is not recommended the scope in which organization has to consider. TOGAF clearly mentioned that the choice of scope is "critical" and its success base upon architecture efforts. As organizations have different goal and objectives, it's important to recognizing those goals (special long term goal). He continued that its crucial for organization to understand base on which scope, decision are taken and "to set expectation right for what is the goal of effort" (TOGAF, version 8.1.1).

4.3 FEAF

The Federal Enterprise Architecture Framework (FEAF) created by Federal CIO Council on September (1999), addressed to develop Enterprise Architecture, Federal agencies or any system that transcends multiple inter-agency boundaries. According CIO Council, FEAF is build on common business practices and design in a way that cross an organizational boundaries. It claims to provide necessary rules and guidelines for initiating, developing, applying and maintaining in enterprise architecture. Later in year (2002) it was launched as an initiative of the United Office of Management and Budget (CIO, 2001). FEAF claim to" *provide a structure for organizing deferral resources and for describing and managing Federal EA activities"*(CIO Council, 2001).

FEA defines as strategic information base provides necessary information to business with the aim of operating between business and technologies. This will support business operations and transactional processes for applying new technology and responsively to required changes of the business. The FEA framework itself, defines as conceptual model that coordinate and documents the structure of business to meet cross –cutting business and design development in government. "*It promotes shared development for common federal processes, interoperability and sharing of information among Federal Agencies* and *other governmental entities"(*CIO Council, 2001). In general, the FEA framework explains "how" FEA is developed and maintain.

FEAF concerns "the end-to-end process" guidelines that initiates implement and sustain an enterprise architecture program as well as covers the roles and responsibilities required for successful EA program (figure 8). Those guidelines address the enterprise life cycle, illustrating the reflection of the process on the areas of program management, engineering, capital planning and investment control (CIO Council, 2001).
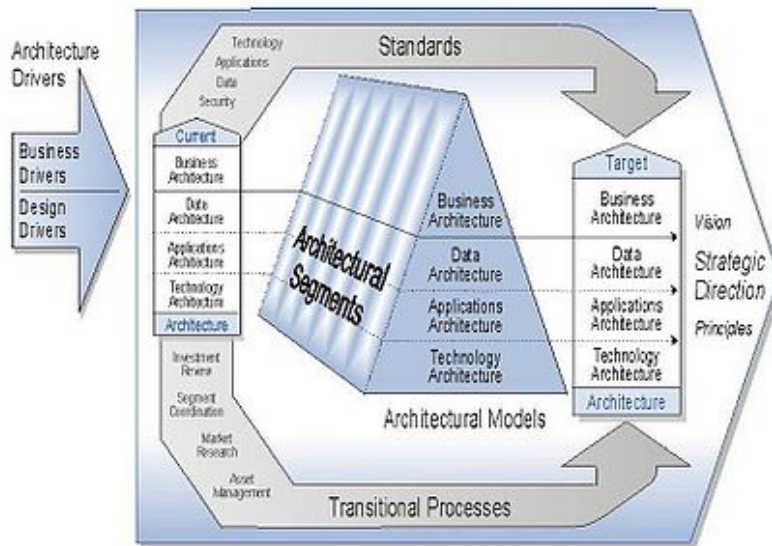
Figure (8), Structure of the FEA components (CIO Council, 2001)

FEAF consider architecture in four parts, which are Business architecture, Data architecture, and Application Architecture and Technology architecture. It also consider four perspectives (adopted from Zachman framework) in its framework which they are: Planner, Owner, Designer, Builder and Subcontractor As it showed on (figure 8), eight components contributes in FEA which are: Architecture derivers, Strategic Direction, Current Architecture, Target Architecture, Transitional planning, Architectural segments, Architectural model and Standards. Those components needed to be identified, developed and maintained (CIO Council, 2001).

Architecture derivers- they divided into two parts of business drivers and design drivers. Business driver would refer to the driver for new administrative initiates, new legislation, new market forces and new budget enhancement for accelerated focus areas while the Design deriver refer to such drivers which interact between new software, hardware and the combination of both and different deployment approaches.

Strategic Direction- consists of goal, principles, vision and objectives that provide guideline for development of target architecture.

Current architecture- defines the current status of EA i.e. "as is". It covers both business and design architecture. The current architecture represents the current capabilities and technologies i.e. the more additional segments are defined, the more likely expand those capabilities are.

Target Architecture- defines "to-be-built" enterprise architecture, which cover target business and design architecture. Those two represent the future "capabilities" and "technologies "which will desirable to attain from designing aspect regarding the support for changing business needs.

Transitional process- define the transition/ migration from "to be" architecture to "to – be-built" architecture. The migration is procedure with the involvement of the areas of migration planning, configuration management, engineering change control and capita IT investment planning.

Architectural segments- concentrates on architectural efforts on major" cross-cutting" business domain. As noteworthy examples we can mention about program areas, common administrative systems, trade or small purchase from electronic commerce. According to CIO Council, architectural segments represent a portion of overall enterprise architecture with concentration on common function or certain enterprise.

Architectural models- focuses on business and design models, which includes the segmentation of an organization description.

Standards – covers all kinds of standards and guidelines for documenting and developing the architecture description of high-priority domains.

The framework also consists of sets of designed "reference models" which are inter-related .The aim is to provide analysis (in cross-agency) as well as the creating standards and identifying of opportunities, gaps, and investments, etc for effective collaboration across the agencies. Here are the five reference models are: The Business Reference Model (BRM), The Components Reference Model (CRM), The technical Reference Model (TRM), The Data Reference Model (DRM) and The Performance Reference Model (PRM) (figure 9).
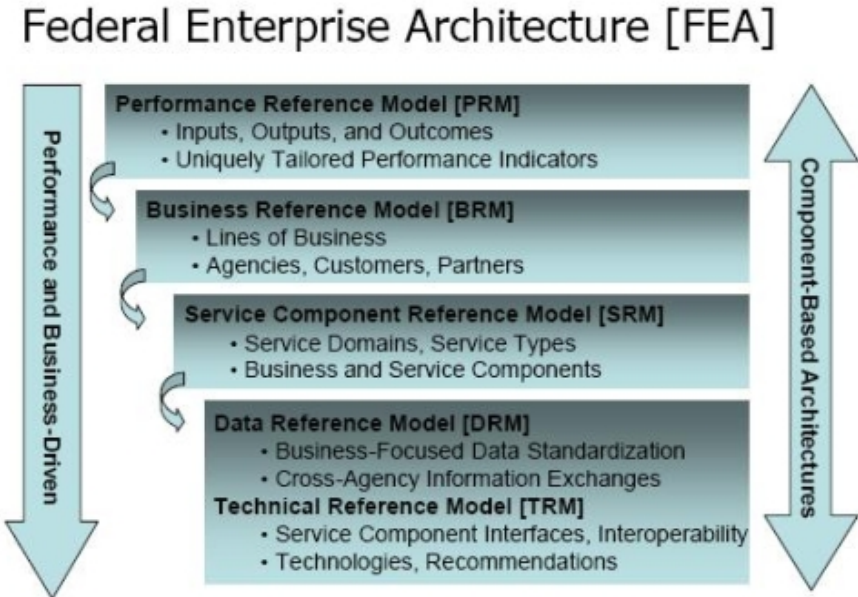

Figure (9), FEA Reference Models, CIO Council, (2001)

TRM is taxonomy, which provides views in different service areas; create common vocabulary for systems, defines various standards and organize technology forecast and technology infrastructure documents. The TRM aim is to support and enabling the service components as well as their capabilities. **DRM** is flexible and standards-base framework which describing data, defining the context of them and sharing of those data cross agencies. **SRM** is "business-driven functional framework" that specifies the service components along with respecting their business support and their performance objectives. It also assists Federal agencies in their IT investments and assets. **BRM** contains a framework for view of various functions in lines of business, agencies, customers and partners in federal government. Those tasks improve the collaboration across the agencies. **PRM** defined as a framework for measuring the standard performance in order to describe the delivered value from enterprise architecture. This will help agencies to manage the business of government at a strategic level (FEA consolidated reference model document, 2007).

According to Sessions (2007), FEA provide process for creating segment architecture in several steps: Architectural analysis, Architectural definition, Investment and Funding Strategy and Program Management plan and executive project.

Architectural analysis defines a "simple vision" for the segment. Furthermore it explains the relation of those segments with enterprise plan while **Architectural definition** provides alternative choice respect design and develops of EA domains (business, data, service and technology architecture) for the segments. Besides, it documents the performance goal. **Investment and Funding strategy** focus on "how the project will be founded" and **Program Management plan and Executive project** set up millstones, measuring the performance, create planning for managing and executing the project.

Another important area within FEAF refers to **FEA Success Measurement**. This addresses Federal agencies with the respect to maturity levels in three main categories as architecture completion, architectural use and architectural result. **The architecture completion** is about the maturity level of architecture it self, while **architectural use** analysis agency respect of their efficiency applying its architecture to drive decision making and **architectural results** focuses on the benefit realization which achieve by using the architecture. This measurement is extremely important for building "momentum" for future work (Sessions, 2007).

5 DISCUSSION
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This chapter examines the use of each alignment pattern of FEM model in enterprise architecture frameworks of Zachman, TOGAF and FEAF.
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5.1 Zachman model & Alignment patters

In this following discussion, each alignment patterns of FEM Model will be examined on Zachman model.

Infological alignment

Infological alignment considers as a harmonious relationship between stakeholders and information system. This alignment concerns for applying the available information system and ICT capabilities to support and satisfy the required needs of stakeholders. Those needs may refer to informational, transactional, service and relational aspects (Svärdström et al 2006; Magoulas et al 2011).

Zachman is an approach which addresses wide ranges of stakeholders as customers, owner, designers, builder and worker respect to the five questions of what, how, where, when, who and when. This taxonomy facilitates views for enterprise concerning different responsibilities and tasks that should take to account (Sowa and Zachman, 1992). However, regarding Infological alignment, this taxonomy has ambiguity. In the Zachman taxonomy, the information provided by each cell, neither are interdependence to each other, nor relevant to communicate outside its local. Moreover, Zachman approach is not adequate in providing guidance of the areas of availability, accessibility, quality and comprehensibility of those provided information.

Socio-structural alignment

Socio-structural alignment considers as harmonious relationship between the structure of power and information systems. The quality of this alignment is largely depends on clear and accepted form of authority as well as their responsibilities. Meanwhile, the relation of IS and process should comprehensible and take into consideration within this alignment, because they may affect the structure of enterprise (Svärdström et al 2006; Magoulas et al 2011).

The Zachman taxonomy simply defines five different perspectives of stakeholders and the areas of their interactions together with data, function, network, people, time and motivation (Sowa and Zachman, 1992). By viewing the Zachman model in one glance, all cells defined clearly by different perspectives and point of views yet the inter-relation among those perspectives are missing. This means that, one stakeholder may perceive one aspect from the area of responsibility while another perceives different aspect. In a sense of Socio-structural alignment, this aspect (the inter-relation between the different perspectives) is an important aspect, which is missing.

According to Svärdström et al (2006), one important fact within Socio-structural alignment is that the structure of IS should cover boundaries and responsibilities whereas, in Zachman model there is no guideline regarding the coverage the boundaries. As it mentioned above, the comprehensibility of IS and process will affect the structure of organization, yet there is no guideline has been introduced in this model regarding the

integration of IS and process. Comparing FEM model's alignment patterns and Zachman taxonomy, the structural alignment in FEM model, refers to "Socio-structural" alignment. This means that in FEM model, the authors focused most in social aspect of alignment while Zachman with its taxonomy provides logical view for an enterprise.

Functional alignment

The Functional alignment refers to the harmonious relationship, which involves the area of information systems and ICT resources and the area of activities and processes. The quality of Functional alignment largely depends on the system i.e. it should be relevant, applicable, accurate as well as creating values to business in timely manner (Magoulas et al, 2011).

In Zachman taxonomy, one of the six abstractions refers to function. Respect to the five different players perspectives, which have been mentioned in Zachman model, those functions may vary (Sowa and Zachman, 1992). As I mentioned before, the inter-relation of Zachman cells is missing. This may lead enterprise to have different views towards especial tasks. As an example of those views, owner may perceive the function as "function flow", designer refer to it, as "information flow model" and customer understand it as "process". The lack of inter-relation between those views and functional aspects is an important fact, which is missing in this taxonomy.

Respect functional aspect, the taxonomy may provide different views to those involving players but will not give them guidelines for step- by- step process. Respectively transition/migration process is not provided either; therefore neither the target architecture defined nor the need for future changes within enterprise. With reviewing Zachman taxonomy I recognized that the question of "how" regarding the system is missing as well. This means that the taxonomy will not guide an enterprise how relevant, applicable, accurate the system should be. Despite of the fact that the question of "when" has been considered in Zachman abstraction box, yet there is no guideline regarding how information system should create value of business to meet the stakeholders in timely manner.

Socio-cultural alignment

Socio-cultural alignment refers to the reflection of the harmonious nature and the relation ships between the area of IS and ICT resources together with the areas of goals, values, objectives and cultures. The key success factors in this alignment are to chase after the question of "how" shared values, collaborative behavior and mutual goal have been addressed within an enterprise (Svärdström et al, 2006; Magoulas et al, 2011).

In Zachman taxonomy, motivation has been considered as one of those six abstractions.
In spite of the fact that "motivation" has been defined on this model, but the view of what motivation is/should be is viewed differently among the players. Goals, business plans, management measures, employees measurement and performance measurement are those concepts that defined as motivation in Zachman taxonomy (Zachman, 1996). The varieties of those concepts are due to variety of involving player's perspective in the taxonomy. Lack of inter-relation between those boxes, lead every participating parties to have an one-direction perspective of what the motivation should be within an enterprise; moreover, the taxonomy will not provide how those motivation should satisfy organizations member which further more meet the goal of organization.

Contextual alignment

Contextual alignment refers to the harmonious relationship between enterprise as whole and IS/ICT together with its external environment. This alignment contains many invisible impacts, but the results would be comprehended through individuals, group or whole business behavior (Svärdström et al, 2006; Magoulas et al, 2011).

Zachman taxonomy consists of 30 cells that provide views to enterprise respect different playing actors and abstractions (Zachman, 1996). In one hand, the taxonomy provide views of whole enterprise (if all cells completed)(Session, 2007), and in another hand, the guideline of how information system is/should be related to organization and its environment is not defined. As it discussed before, the inter-relation between the cells is missing, so in wider review it appears that the two first column of the taxonomy (that relate to business aspects) may not relate to other parts. This means that Zachman taxonomy will not reflect the relation between business domain and information technology.

5.2 TOGAF model & Alignment patterns of FEM Model

In this following discussion, each alignment patterns of FEM Model will be examined on TOGAF model.

Infological alignment

Infological alignment considers as a harmonious relationship between stakeholders and information system. This alignment concerns for applying the available information system and ICT capabilities to support and satisfy the required needs of stakeholders. Those needs may refer to informational, transactional, service and relational aspects (Svärdström et al 2006; Magoulas et al 2011).

TOGAF resource base providing lots of resources and detailed material for supporting ADM for further processing access (TOGAF, version 8.1.1). However, respect Infological alignment, those guidelines are insufficient to avoid information paradox; moreover, there is lack of guidance of how those information will meet stakeholders satisfaction. One of the major elements in Infological alignment is to access to new information. Respect of that matter, TOGAF ADM will provide that new information. As it mentioned in previous chapter, ADM consists of different phases and in the final phases namely "architecture change and management" the new artifact is created which further more lead to the generate of new information.

Socio-structural alignment

Socio-structural alignment considers as harmonious relationship between the structure of power and information systems. The quality of this alignment is largely depends on clear and accepted form of authority as well as their responsibilities. Meanwhile, the relation of IS and process should comprehensible and take into consideration within this alignment, because they may affect the structure of enterprise (Svärdström et al 2006; Magoulas et al 2011).

TOGAF has based on governance contracts (TOGAF, version 8.1.1), so in that sense, the responsibility and ownership has been clarified. However, according to Svärdström et al, (2006), Socio-structural alignment should address the whole enterprise. In this sense, the

lack of inter-connection between the area of responsibility and ownership to the other areas of business is something that is insufficient in TOGAF framework.

Functional alignment

The Functional alignment refers to the harmonious relationship, which involves the area of information systems and ICT resources and the area of activities and processes. The quality of Functional alignment largely depends on the system i.e. it should be relevant, applicable, accurate as well as creating values to business in timely manner (Magoulas et al, 2011).

Generally, in TOGAF framework and specifically in TOGAF ADM, the focuses are most towards creating process, operational activities and transactional planning. Moreover, TOGAF is among flexible frameworks, which its processes can be combined, ignored, reshaped and remained incomplete (TOGAF, version 8.1.1; Sessions, 2007). With considering the fact that Functional alignment focus on the interaction of the area of IS and the area of activities and process, this framework will meet those expectation in some extend; however, there is a lack of guidance in this framework regarding how those processes should interact with information system and information communication system.

Socio-cultural alignment

Socio-cultural alignment refers to the reflection of the harmonious nature and the relation ships between the area of IS and ICT resources together with the areas of goals, values, objectives and cultures. The key success facts in this alignment are to chase after the question of "how" shared values, collaborative behavior and mutual goal have been addressed within an enterprise (Svärdström et al, 2006; Magoulas et al, 2011).

According to TOGAF (version 8.1.1), the first phase of TOGAF ADM namely Architecture vision phase refers to creating vision. However, by reviewing the TOGAF framework, it has not been found any document regarding how to transform those visions to stakeholders respect goal and objectives. According to socio-cultural alignment aspect, the interaction of IS with stakeholders should meet their satisfaction and also comply with organizational goal (Svärdström et al, 2006). Provide guidelines about creating a vision that complies with those aspects is an important aspect, which is missing in TOGAF framework.

Contextual alignment

Contextual alignment refers to the harmonious relationship between enterprise as whole and IS/ICT together with its external environment. This alignment contains many invisible impacts, but the results would be comprehended through individuals, group or whole business behavior (Svärdström et al, 2006; Magoulas et al, 2011).

TOGAF in general view will cover some aspects of Contextual alignment. It owned by government, therefore the alignment address TOGAF enterprise architecture and governance (TOGAF, version 8.1.1).This alignment, according to Magoulas et al (2011) has been made by operational and governance contracts. Concerning enterprise and its environment they are two required demands within this framework: first is that the enterprise must aligned with laws and regulations and second is that intellectual property must take into consideration within the business domain (Magoulas et al, 2011). Respect Contextual alignment, TOGAF has some uncover area as: 1-The insufficient alignment between the alignment of enterprise and its purpose due to the lack of required definition of business scope, 2- lack of guidance of the alignment between IT and business strategy

and lack of guidance regarding how the enterprise and its implementation has managed in alignment perspectives (Magoulas et al, 2011).

5.3 FEAF Model & Alignment patterns

In this following discussion, each alignment patterns of FEM Model will be examined on FEAF model.

Infological alignment

Infological alignment considers as a harmonious relationship between stakeholders and information system. This alignment concerns for applying the available information system and ICT capabilities to support and satisfy the required needs of stakeholders. Those needs may refer to informational, transactional, service and relational aspects (Svärdström et al 2006; Magoulas et al 2011).

FEAF has been based on segmentation of its architecture (CIO Council, 2001). This facilitates the information flow within enterprise, which would refer to one of the necessary task in Infological alignment. Moreover, this segmentation will help to create more information. However, in FEAF there have been no guidelines observed regarding the fact of how information should communicate with stakeholders neither the question of how those information should support stakeholder's need and satisfaction.

Socio-structural alignment

Socio-structural alignment considers as harmonious relationship between the structure of power and information systems. The quality of this alignment is largely depends on clear and accepted form of authority as well as their responsibilities. Meanwhile, the relation of IS and process should comprehensible and take into consideration within this alignment, because they may affect the structure of enterprise (Svärdström et al 2006; Magoulas et al 2011).

FEAF addresses Federal agencies and their multiple inter-agencies therefore the main concept of ownership that is central concept in Socio-structural alignment has been defined yet the lack of insufficient connection between the area of ownership and business scope have been observed in this framework.

Functional alignment

The Functional alignment refers to the harmonious relationship, which involves the area of information systems and ICT resources and the area of activities and processes. The quality of Functional alignment largely depends on the system i.e. it should be relevant, applicable, accurate as well as creating values to business in timely manner (Magoulas et al, 2011).

FEA focuses most in creating processes within its framework. Not only the framework defines the necessary processes, but also it provides a view for migration process, which is needed for organizational change (CIO Council, 2001). However, the attention to the matter of the interaction between those processes together with IS/ICT is insufficient in this framework. FEAF claims that by following those recommended procedures in general term, and the transition path in specific, organization will meet the necessary changes. This is an important aspect in business change, yet the other important aspect for business change is partly mainly missing in this framework.

Socio-cultural alignment

Socio-cultural alignment refers to the reflection of the harmonious nature and the relation ships between the area of IS and ICT resources together with the areas of goals, values, objectives and cultures. The key success facts in this alignment are to chase after the question of "how" shared values, collaborative behavior and mutual goal have been addressed within an enterprise (Svärdström et al, 2006; Magoulas et al, 2011).

On of the aim within FEAF Reference model is to facilitate cross-agency analysis and to identify the opportunities for collaboration within across agencies (CIO Council, 2001). These tasks refer to establishing common language within enterprise, which is extremely important in Socio-cultural alignment. In spite of the fact that the framework defines those aspects, yet there have been lack of sufficient guidelines regarding the fact of how IS should be aligned with organizational goal, cultures and values.

Contextual alignment

Contextual alignment refers to the harmonious relationship between enterprise as whole and IS/ICT together with its external environment. This alignment contains many invisible impacts, but the results would be comprehended through individuals, group or whole business behavior (Svärdström et al, 2006; Magoulas et al, 2011).

FEA framework mostly meets those Contextual aspects. The contextual alignment defines the area of FEA framework, the enterprise and Federal agencies and their dependencies. Respect enterprise architecture and its environment, FEAF must be aligned with law and regulation as well as external policies. FEAF has insufficient effort in some domains concerning Contextual alignment, which are: 1) the lack of alignment between IT/IS strategy and business strategy 2) lack of guidance of how IS, business and its environment should be aligned to meet companies goal and objective.

5.4 Summary of Discussion

What have been discussed in three models of Zachman, TOGAF and FEAF and five alignment patterns of FEM model as Infological alignment, Socio-structural alignment, Functional alignment, Socio-cultural alignment and Contextual alignment, is summarized in following charts (Figure 10). The figure will illustrate that, in spite of the facts that some frameworks have some similarities and differences respect those alignment patterns, yet none of them, apply those alignments patterns in real meaning of alignment. The following figure analysis those aspects with consideration of those facts:

- *The coverage of the alignment patterns on those models*
- *The extent of those coverage*
- *Suggestion for obtaining those alignment*

	Zachman	TOGAF	FEAF	Similarities/Differences & Recommendations
Infological alignment	-No relations between IS and stakeholders	- Lack of defined relations between IS &stakeholders	- Insufficient defined relation between the are of IS& stakeholders	- Zachman doesn't provide any alignment; TOGAF& FEAF have offered poor alignment
	- No ground for alignment	-Poor basis for alignment	- Poor basis for alignment	- Decentralization or more adaption from stakeholders in this domain is highly recommended.
Socio-structural alignment	- No relations Between the structure of power &IS	- Lack of defined relations between IS &the structure of power	- Insufficient defined relation between IS &the structure of power	-Zachman doesn't provide any alignment; TOGAF& FEAF have offered poor alignment.
	-No ground for alignment	-Poor basis for alignment	-Poor basis for alignment	-Centralization with decoupling of structure is highly recommended.
Functional alignment	- No relations between IS & processes	- Lack of defined relations between IS & processes	- Insufficient defined relation between IS &processes	Zachman has not defined the alignment; TOGAF & FEAF have poor access to this alignment.
	-No ground for alignment	-Poor basis for alignment	-Poor basis for alignment	- Minimizing the need for information or maximizing capabilities of provider are recommended to reach this alignment.
Socio-cultural alignment	-No relations between organizational goals & IS	- Lack of defined relations between IS & organizational goal	- Insufficient defined relation between IS &organizational goal	Poor alignment patterns have been viewed in TOGAF& FEAF; Zachman has not met this alignment.
	-No ground for alignment	-Poor basis for alignment	-Poor basis for alignment	- Negotiation to achieve balance in harmony is needed for reaching this alignment.

Contextual alignment	- No relations between IS, business & its environment	- Lack of defined relations between IS, business & its environment	- Insufficient defined relations between IS & business & its environment	- Poor alignment patterns have been viewed in TOGAF& FEAF; Zachman has not met this alignment.
	-No ground for alignment	-Poor basis for alignment	-Poor basis for alignment	- Balancing harmony within the areas of IS, business& its environment is highly recommended.

Figure (10),The impact of alignment patterns on Zachman, TOGAF& FEAF, (Conceptual chart).

6 CONCLUSION

The primary aim of this report is to answer the question of how alignment patterns are handled within architectural framework. This issue has been investigated with respect to Infological, Socio-structural, Functional, Socio-cultural and Contextual alignment and investigated enterprise architecture frameworks as Zachman, TOGAF and FEAF.

Firstly, the Infological, Socio-structural, Functional, Socio-cultural and Contextual alignments are among those alignments, which are needed for enterprise architecture to consider. However, by comparison between different literatures of investigated frameworks, I realized that none of those frameworks discussed about those alignments.

FEM model reflects the harmonious relationships of the area of IS and ICT resources together with the area of stakeholders and their responsibilities, the area of decisional rights and responsibilities, the area of enterprise goals, objectives and values, and the area of enterprise activities and management. Those relation areas as "alignment" considers as both ways, while those investigated framework's views to those patterns are mostly have based on one-way connection. This means that the alignment is not considered in those methodologies or if they have addressed, the connection are so poor. However, the only alignment that is in some extent relevant to all investigated framework was contextual one. The reason for that, I suppose is that it concerns general view of enterprise architecture and its environment which most frameworks in some extend provide that.

Secondly, those frameworks mostly discuss about hard part of architectural, where it is involving of the area of enterprise architecture activities and management, the area of decisional rights and responsibility together with the area of information system and ICT resources. The soft part of architectural, which are related to the areas of enterprise goals, objectives and values, the area of stakeholders and their responsibilities together with the area of IS and ICT resources are not center of attention for those frameworks. Focusing on soft architectural part is extremely important since stakeholders are fundamental base for all enterprise architecture that without those "base" enterprise architecture will not survive.

Thirdly, the important aspect as "business value" is not identified by none of those investigated frameworks. Neither of those frameworks provides views or guideline regarding how organization can realize their benefits or the way to achieve the business value. As it mentioned on FEM model, one way that organization can understand their benefit realization is focusing on the alignment aspects. Thus, in order for an enterprise realizing its benefit, it is crucial to focus of alignment aspects. As a result, this leaded me to have final conclusion about the aspect of alignment patterns and investigated enterprise architecture frameworks:

With the comparison between FEM Model alignment patterns and investigated enterprise architectural frameworks, I define that none of those frameworks consider alignment pattern clearly in their works. This means that alignment patterns are not handled within those architectural frameworks. The aspects, which most investigated architectural frameworks concerns, are the consideration of the constructed parts of FEM model and not the reflection of alignment between them.

Here, I admit three recommendations as well as suggestion for further studying as flows:

1) Enterprise architecture frameworks should focus more on those alignment patterns in order to achieve the business value and benefit realization.

2) The main focus of any architectural frameworks should towards meeting stakeholder's goal and satisfaction in changing events i.e. stakeholders' commitment for change must meet at first priority. This is important task, which is missing in most today's architectural frameworks.

3) And finally, not only those architectural frameworks together with alignment patterns are essential for an enterprises but also choosing right architectural framework, interpreting those frameworks respect to the matters such as constructing elements, alignment factors and its environment are essential for enterprise. This refers to the role of skilled architecture, which is always prerequisite for learning tasks.

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7.4 Figures

Figure 1*, Enterprise Architecture's domains,* Pessi, K. (2010).

Figure 2, *Strategic Alignment Model,* Henderson & Venkatraman (1993).

Figure 3, *Four different alignment perspectives, managements and their criteria*, Conceptual chart, adopted fro Henderson & Venkatraman (1993).

Figure 4, *FEM Model, The Framework for Understanding Enterprise Morphology,* Magoulas, T& Hadzic, A& Saarikko ,T &Pessi, K. (2011).

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Figure 6, *TOGAF Enterprise Continuum,* Sessions, R. (2007)

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