Enterprise Architect's Roles in a Proactive Enterprise Development Context

PED model for understanding the role of an Enterprise Architect in a Proactive Enterprise Development context

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Abstract:

The main purpose of our study is to provide a sound ground for understanding the role and competencies of the Enterprise Architect in a proactive enterprise development. This knowledge can help in contributing towards the improvement of such influence by the Enterprise Architect in practice. We have tried to satisfy the above purpose though the elucidation of the following question:

  "What are the essential roles and competencies of an Enterprise Architect in relation to proactive enterprise development?"

Our study provides a model for proactive enterprise development (PED model) in order to answer the above main question and we have carried this out in the following ways:

First and foremost, we started our study by carrying out an extensive literature study on enterprise development out of which we have been able to create a model for proactive enterprise development. Thereafter, we designed our interview questions which have been generated from the specific domains of our model.   In order to test the reliability of our model in terms of empirical support, we have been able to interview four very experienced Enterprise Architects. Our empirical study has revealed the existence of a strong empirical support for our model although it has been limited to only four respondents.

We have observed that both the literature study and the empirical study conform to our PED model and our study has revealed the following essential roles of an Enterprise Architect in a proactive enterprise development context:

As an agent of change during the Strategic Situation Analysis phase; as a facilitator, consultant and conflict resolver during the formation of the vision, mission and strategy of the enterprise; as an expert and designer of the future of the enterprise during the architectural design phase; as a facilitator and conflict resolver during the change management phase; and as a coordinator during the architectural implementation of the negotiated changes.

We believe that the role of an Enterprise Architect has a strong impact on proactive enterprise development and his/her impact can be seen in the way he/she recommends the stakeholders to use a system of architectural principles in order to shape their future business or public enterprise reality. Furthermore, the concept of proactivity can be understood in terms of planning a desired future development of the enterprise and their stakeholders.

Acknowledgements:

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1. Introduction

1.1 Background

Carrying out changes in enterprise development can prove to be a real challenge to many companies as it has been revealed by failure of many projects including IT investment projects in various organizations over the years. A case in point is the Standish Group "CHAOS Summary 2009" whose astounding results, based on the table below, revealed significant decrease in project success rates where only 32% of the projects succeeded as they were considered to have been delivered on time, on budget, with required features and functions. While on the other hand, 44% of the projects were challenged as being late, over budget, and/or with less than the required features and functions, and about 24% of the projects failed either due to cancellation before their completion or were delivered but never used. In essence, the report illustrated more project failures than project successes and according to the Standish Group (2009) CIO at the time, the above percentages depict a decrease in the success rates from the previous studies and a significant increase in the number of failures (The Standish Group, 2009).

	1994	1996	1998	2000	2002	2004	2006	2009
Successful	16%	27%	26%	28%	34%	29%	35%	32%
Challenged	53%	33%	46%	49%	51%	53%	46%	44%
Failed	31%	40%	28%	23%	15%	18%	19%	24%

Table1: *Adapted from the Standish Group "CHAOS Summary 2009"*

It's upon this background that we believe that the Enterprise Architect has a significant role to play in an endeavor to deal with the above challenge that faces a number of organizations. Consequently, we are interested in investigating the Enterprise Architect's role in a proactive enterprise development context.

Furthermore, among other things, the Enterprise Architect should take into account the following aspects:

Why do some companies succeed in use of technology in the context of enterprise development while others fail? Can an Enterprise Architect do something about this fact?

We believe that the existence of an Enterprise Architect in the context of proactive enterprise development does make sense. Why is this so?

Accordingly, an explanation can be provided in terms of complexity. Van der Raadt and Van Vliet (2008) argue that it is every CEO's desire to have one standardized, integrated, flexible and manageable organizational landscape of aligned business and IT processes, systems and procedures. Such a desire can be fulfilled by ensuring a complete control over all projects implementing changes in such a landscape so that they deliver solutions that suit the corporate and IT change strategies. Yet as ideal as it sounds, the reality for many large organizations is quite the opposite. Many large organizations strive to keep a check on their escalating

operational and change management costs. The fundamental reasons for this dilemma are the inflexibility and enormous complexity of their business and IT structures, processes, systems, and procedures which are often distributed across lines of business and business divisions spread out over various regions, countries or even continents Van der Raadt and Van Vliet (2008).

An Enterprise Architect must have the capacity to create or manage complexity and by doing so provide a comprehensive architecture. Furthermore, it should be noted that the emergence of Enterprise Architecture (EA) as a mechanism for dealing with complexity has resulted into a newly evolving profession of the Enterprise Architect (Strano and Rehmani, 2007).

Another explanation can be given in terms of continuous enterprise development due to the dynamics of external factors that impact the enterprise. For instance, it should be noted that emotional change as well as technological change have a strong impact on the enterprise in general and the Enterprise Architecture in particular.

Lastly, every specific enterprise consists of many different groups of stakeholders with varying interests and with different bases of power. However, an attractive and meaningful architecture facilitates the shaping and creating of an enterprise that generates win/win effects for all the interested parties; that is to say, stakeholders.

In summary, despite of the fact that an Enterprise Architect does not have power per se, his/her position or existence in this context becomes a necessary and sufficient factor for a fruitful enterprise development. Fruitfulness can be given in terms of a continuous meaningful development which is not included in the above statistics.

Figure 1 below can be used to summarize the primary role of an Enterprise Architect in enhancing the designing and redesigning of the goals and objectives of the enterprise into architected reality thereby promoting proactive enterprise development. It should be noted that planning for change is vital for most modern enterprises, yet plans that are never executed have little value. Furthermore, continuous business improvement is a result of proper coordination between planning and execution. This coordination requires a clear understanding of the life cycles of the enterprise and the establishment of appropriate collaboration and governance processes. Thus, it is no longer enough to only focus on optimizing business processes and solutions; the enterprise rather needs to optimize the processes of change itself as well (Jensen et al, 2011).
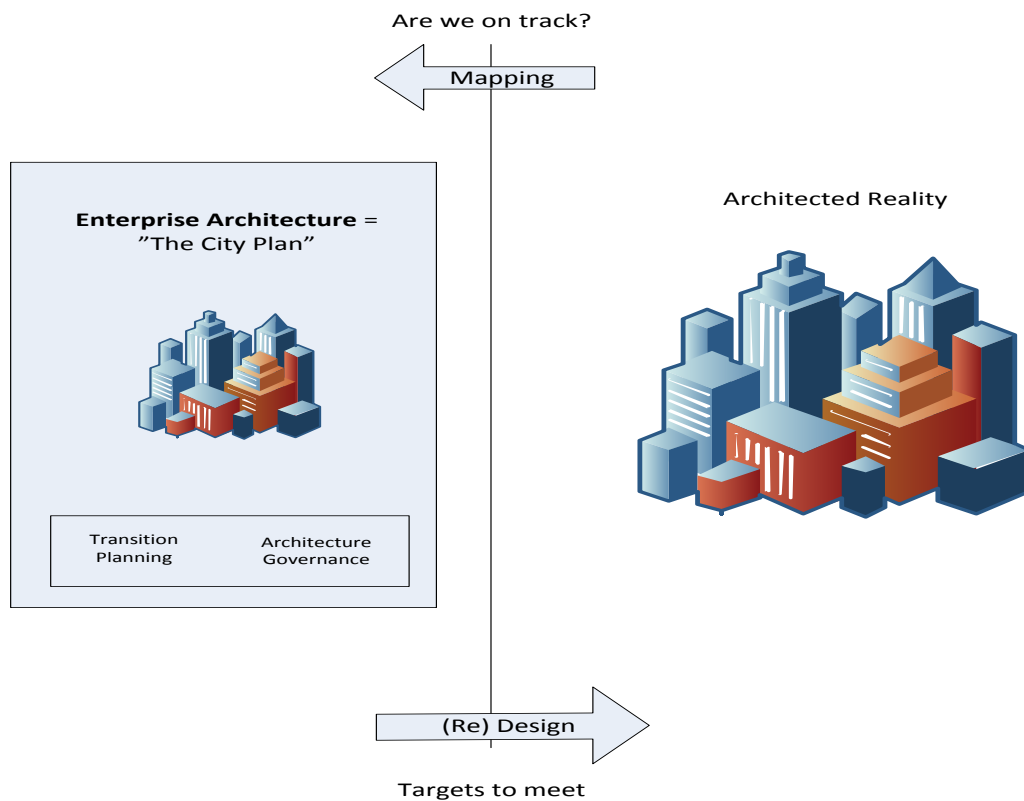
Figure 1 *Architected Reality - An inspiration from IBM Redbooks (Jensen et al., 2011)*

1.2 The purpose of our study

The main purpose of our study is to provide a sound ground for understanding the role and competencies of the Enterprise Architect in a proactive enterprise development. This knowledge can contribute towards the improvement of such influence by the Enterprise Architect in practice. We have tried to satisfy the above purpose through the elucidation of the following question:

 "What are the essential roles and competencies of an Enterprise Architect in relation to proactive enterprise development?"

Consequently, we have studied the preceding question with the help of the selected theory and have investigated thereafter to find out whether the said theory has empirical support. Moreover, we've done this by creating a model (PED model) with the help of the theory and in turn investigate to see if our model has empirical support by conducting interviews based on the questions extracted from our model.

In essence, we are addressing the ways through which architectural competencies can affect the meaningfulness of an enterprise from the stakeholder's perspective and management perspective. The notion of meaningfulness of the architecture provides win/win effects to all

the involved stakeholders (Smith: How to measure success). However, traditional views of architecture considered and measured the architecture in terms of savings, productivity and increased efficiency (Hedberg, 1980). According to our view this last statement represents only the hard part of architecture. Therefore, an Enterprise Architect is capable to propose an architecture that covers both hard and soft goals and values.

1.3 Delimitation

This study focuses on the role and responsibilities of an Enterprise Architect in the context of a proactive enterprise development. However, our interest is to address the context of Enterprise Architecture and its role, rather than the enterprise technical infrastructure. Therefore, the technical implementation that belongs to the relevant changes proposed for the development of the enterprise doesn't concern the satisfaction of the technical requirements. Thus, the Enterprise Architect is responsible for providing the alignment between the business enterprise and the information system that supports the enterprise with information services and other kinds of support. However, the task of examining how these systems are implemented lies outside of the borders of our study.

Furthermore, it should be noted that the concept of an architect has become a comprehensive phenomenon. Consequently, we have information systems architects, business architects, database architects, software architects, communication architects, information architects, etc. However, from our point of view, all these categories of architects express knowledge and competencies that an Enterprise Architect is expected to have that's why we choose to focus on the Enterprise Architect in our thesis.

Lastly, we are aware that there are several other models that describe the development of an Enterprise Architect such as The Open Group Architecture Framework (TOGAF). However, there is a difference between an approach to promote the proactive development of the enterprise through the support of an Enterprise Architect than to create many artificial representations that no one understands and uses.

1.4 Some Working definitions

Enterprise Architect: The term architect can be used to describe a person whose responsibility is the design of architecture and the creation of an architectural description where architectural description or prescription in this context refer to a collection of products such as a specific document, report, analysis, or models to document an architecture; hence an Enterprise Architect is someone who specializes in Enterprise Architectures (Sessions, 2006).

Model: A model is a conceptual representation of all the primary features contained in a given situation which is essential for the problem under investigation (Hernes, 1979). According to Høivik (1974), a model can be described as an idealized picture of a phenomenon or a feature where certain characteristics in reality can be isolated or stressed while other properties are excluded.

Architecture: This refers to structures and relationships described in various views, documents, assumptions and rationale. It focuses in providing overall enterprise system views, showing system building-blocks and their interrelationships; address cross-cutting concerns, taking an enterprise-wide view in setting priorities and making trade-offs (Bredemeyer, 2002).

According to Zachman (2006), architecture can be defined as that set of design artefacts, or descriptive representations, that are relevant for describing an object such that it can be produced to requirements (quality) as well as maintained over a period of its useful lifetime (change).

Architectural strategy: This translates business strategy to architecture strategy; sets technical directions for the enterprise; establishes architectural vision, principles, philosophy and objectives. It focuses on high-level decisions that will strongly influence the architecture of the system; rules certain choices out and guides selection decisions and trade-offs among others (Bredemeyer, 2002).

Russell Boyd defines ***Enterprise Architecture*** as a strategic information asset base, which defines the mission, the information necessary to perform the mission, and the transitional processes for implementing new technologies in response to the changing mission needs. Enterprise Architecture includes baseline architecture, target architecture, and a sequencing plan. Enterprise Architecture Management (EAM) addresses at a holistic way the elements of strategy, frameworks, the overall EA process, methods and techniques, standards and tools to enable the coordination and delivery of the various elements that make up the Enterprise Architecture within the organization to maximize business benefits (EA Management Guide, 2005).

Enterprise Architecting: This comprises of the activities and processes of developing and strengthening an enterprise' architectural environment in order to support the mission of the enterprise. Enterprise Architecting applies Enterprise Architectural approaches to a specific enterprise to improve its structure. The architectural approaches include EA principles, EA frameworks, EA methodologies, EA processes, EA tools and techniques, and EA body of knowledge. The objectives of Enterprise Architecting are to align elements, harmonize relationships, optimize locations, streamline interactions, coordinate timing, and connect past, present, and future. Through achieving these objectives, Enterprise Architecting reaches its goal of making the entire enterprise more productive, efficient, and in harmony. (EA Management Guide, 2005)

Enterprise Architecture Framework: A practical guide to Enterprise Architecture helps readers create adaptive architecture strategies for successfully implementing Enterprise Architectures. We want therefore to give some definitions on Enterprise Architecture and some other concepts from different authors' perspective (EA Management Guide, 2005).

Organizational Change: This refers to the various change endeavors that are carried out within a given organization. This kind of change can either be incremental in various departments or radical thus taking place within the entire organization. Organizational change is closely related to the concept of change management which is defined in the following paragraphs.

Change Management: This can be described in a number of ways. For instance, Nickols (2006) suggests that change management can be defined as the task of managing change; as a field of professional practice; as a body of knowledge that comprises of various models, methods, change concepts, skills, and so forth; and as a control mechanism that comprises of requirements, standards, processes and procedures that are used in the process of change.

1.5 Disposition
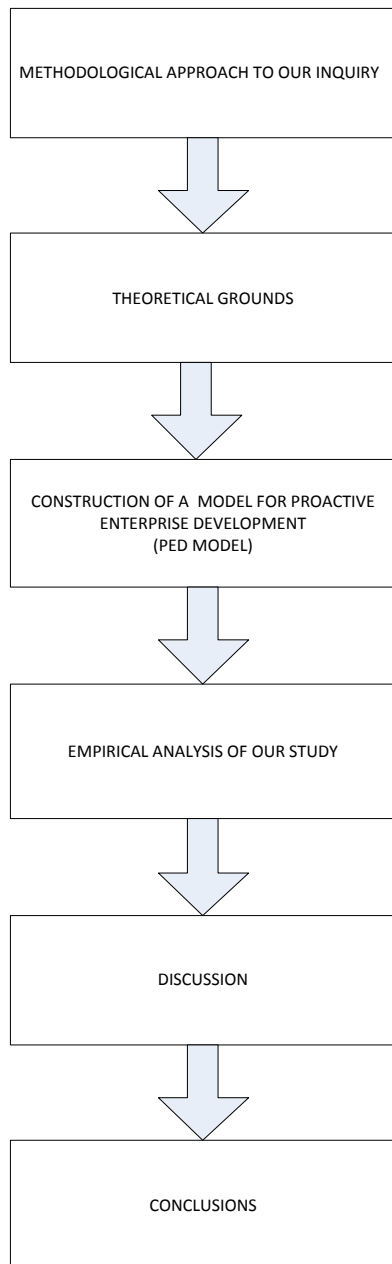
METHODOLOGICAL APPROACH TO OUR INQUIRY	Chapter 2: This chapter is divided into three parts: • In the first part, we establish the foundation of our study; • The second part deals with the research approach; • The third part deals with the requisite of quality regarding knowledge creation.
THEORETICAL GROUNDS	Chapter 3: In this chapter, we present the theoretical grounds for our model.
CONSTRUCTION OF A MODEL FOR PROACTIVE ENTERPRISE DEVELOPMENT (PED MODEL)	Chapter 4: In this chapter, we describe how we have interpreted the theoretical framework and we present the design of enquiries that we have created from the PED model.
EMPIRICAL ANALYSIS OF OUR STUDY	Chapter 5: In this chapter, we present our interpretation of the empirical study.
DISCUSSION	Chapter 6: In this chapter, we discuss the empirical results in relation to our model (PED).
CONCLUSIONS	Chapter 7: In this chapter, we present our conclusions regarding the essential roles of an Enterprise Architect in a proactive enterprise development context.

2. Methodological Approach to our Inquiry

The methodology followed in writing this thesis is classified into three main parts. First and foremost, whereas part one deals with establishing the foundation of our study and dealing with the requisite of relevance, part two deals with the research approach in general and part three deals with requisite of the quality of knowledge creation which entails validity and reliability of the model which is the impetus for our thesis.

2.1 Establishing the foundation of our study

In a nutshell, part one of our methodological approach of inquiry in our thesis work encompasses the purpose and problem statement; logical delineation; literature overview; and model construction and the design of queries.

In essence, we are addressing the ways through which architectural competencies can affect the meaningfulness of an enterprise from the stakeholder's perspective and management perspective. The notion of meaningfulness of the architecture provides win/win effects to all the involved stakeholders (Smith: How to measure success). However, traditional views of architecture considered and measured the architecture in terms of savings, productivity and increased efficiency (Hedberg, 1980). According to our view this last statement represents only the hard part of architecture. Therefore, an Enterprise Architect is capable to propose an architecture that covers both hard and soft goals and values.

An overview of the logic of inquiry to be followed

The following model in figure 2 below illustrates the methodology of how we have chosen to work with our thesis.
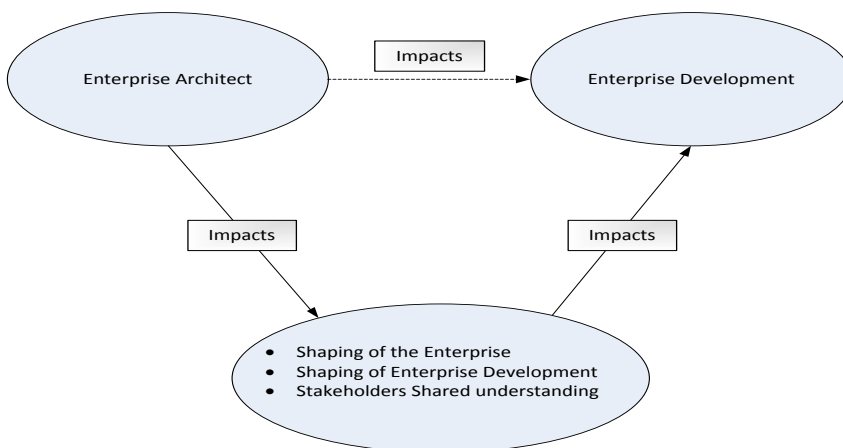

Figure 2: *The impact of the roles and competencies of Enterprise Architects on proactive enterprise development*

In this section we describe the logic of inquiry that we have chosen to use in our thesis. In essence, the approach that has been followed in the inquiry of understanding pertaining to the Enterprise Architect's role in a proactive enterprise development is both normative and descriptive where the former refers to being theory-driven and the later refers to being experience-driven respectively.

First and foremost, our methodology in writing this thesis begins with the problem formulation as illustrated by figure 2 above. We investigate how the Enterprise Architect impacts the shaping of the enterprise and the shaping of enterprise development through the designing of the Enterprise Architecture. However, it should be noted that emphasis is put on effect-based development in this context. In addition, we also address the impact of the Enterprise Architect on all the various stakeholders' shared understanding. In essence, the Enterprise Architect's impact on shaping the enterprise and enterprise development together with stakeholders shared understanding does form what we refer to as ground A in our research work. It is this ground A which addresses the question of social and practical competencies associated with the roles of an Enterprise Architect during the process of enterprise development. This in turn impacts proactive enterprise development and it formulates ground B in our research that deals with the question of how an Enterprise Architect evaluates the qualities of his or her competencies.

Finally, it is upon these two grounds; i.e. ground A and ground B that we ascertain the Enterprise Architect's impact on enterprise development which in turn forms the hypothesis of our thesis thereby addressing the main question: *"What are the essential roles and competencies of an Enterprise Architect in relation to proactive enterprise development?"*

2.2 Research Approach in General

This second part of our methodology addresses the research approach that we have used in our thesis. In general, our research approach has been facilitated by a combination of the qualitative method, induction, deduction and abduction.

We have chosen to use the qualitative method in our thesis through conducting structured interviews in order to obtain a deeper understanding of the subject matter, which is necessary in achieving the purpose for the thesis. We have taken the respondents' experience and their subjective views during our analysis of the empirical results (Bryman and Bell, 2005). Furthermore, we have decided to apply this method in order to obtain a deeper understanding and thus getting an overall picture of the subject matter (Holme and Solvang, 1997).

Induction is another research approach that we have chosen to use in our thesis in order to acquire a clear understanding of the subject matter and help us create a model based on well-established theories in organizational development. In our research, we have chosen to start with already existing and well established theoretical material to help us put together different theoretical perspectives in order to formulate a hypothesis or a model which has been tested with the help of the empirical research (Holme and Solvang, 1997).

In addition, whereas the deduction method has helped us move from the general to the specific aspects of our study as we address most common perceptions of the relationship that exist between theory and practice in relation to the role of Enterprise Architects in a proactive enterprise development context (Bryman and Bell, 2005), the abduction method has helped us minimize the uncertainties and difficulties associated with research work thereby leading to

an increase in our knowledge of the research topic and the explanatory content of theories involved (Charles Peirce, 1839-1914).

Method in Our Study

2.2.1 Literature Study

This section gives an overview of the literature that forms the theoretical study of our thesis work. It entails the literature that has formed the foundation for our model formulation. According to Backman (1998), it is imperative to study the available literature and any documentation related to a given theme or topic prior to proceeding with the research work since this provides a better approach hence avoiding unnecessary repetition of the research that has already been carried out. Therefore, after our problem formulation, we have embarked on collecting the theory, which has contributed, to the creation of our model in relation to addressing the role of an Enterprise Architect in a proactive enterprise development context. In other words, it is the distillation of the theory that has helped in the design of a model which is instrumental in revealing the extent to which an Enterprise Architect can impact proactive enterprise development.

The primary purpose of using models in various situations is to review and analyze the reality in a satisfactory manner since we live between two worlds; the model world and the real world which can be mirrored or represented by the model (Holme and Solvang, 1997). In essence, we have created the PED model in order to mirror the role of an Enterprise Architect in the proactive enterprise development context. Therefore, our thesis presents a proactive model which is derived from four different approaches in organizational development namely, the emotional or inspirational approach (Checkland, 1985), the rational approach (Mackenzie, 1984), the political approach (Hedberg, 1980) and the alignment approach (Tichy, 1983). Consequently, our model is derived from the strategic rope metaphor of the organization as presented by Tichy (1983) in figure 3 below:
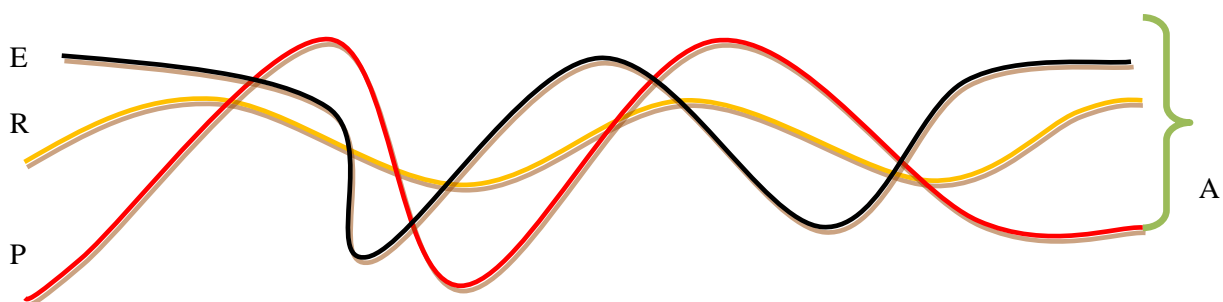
Figure 3: *An inspiration from Tichy's Strategic Rope (Tichy, 1983)*

The various abbreviations in the above figure depict the following:

- E represents the Emotional or Inspirational approach (Checkland, 1985);

- R represents the Rational approach (Mackenzie, 1984);

- P represents the Political approach (Hedberg, 1980); and

- A represents the Alignment approach of the preceding three approaches (Tichy, 1983).

2.2.2 Model Construction and Design of Queries
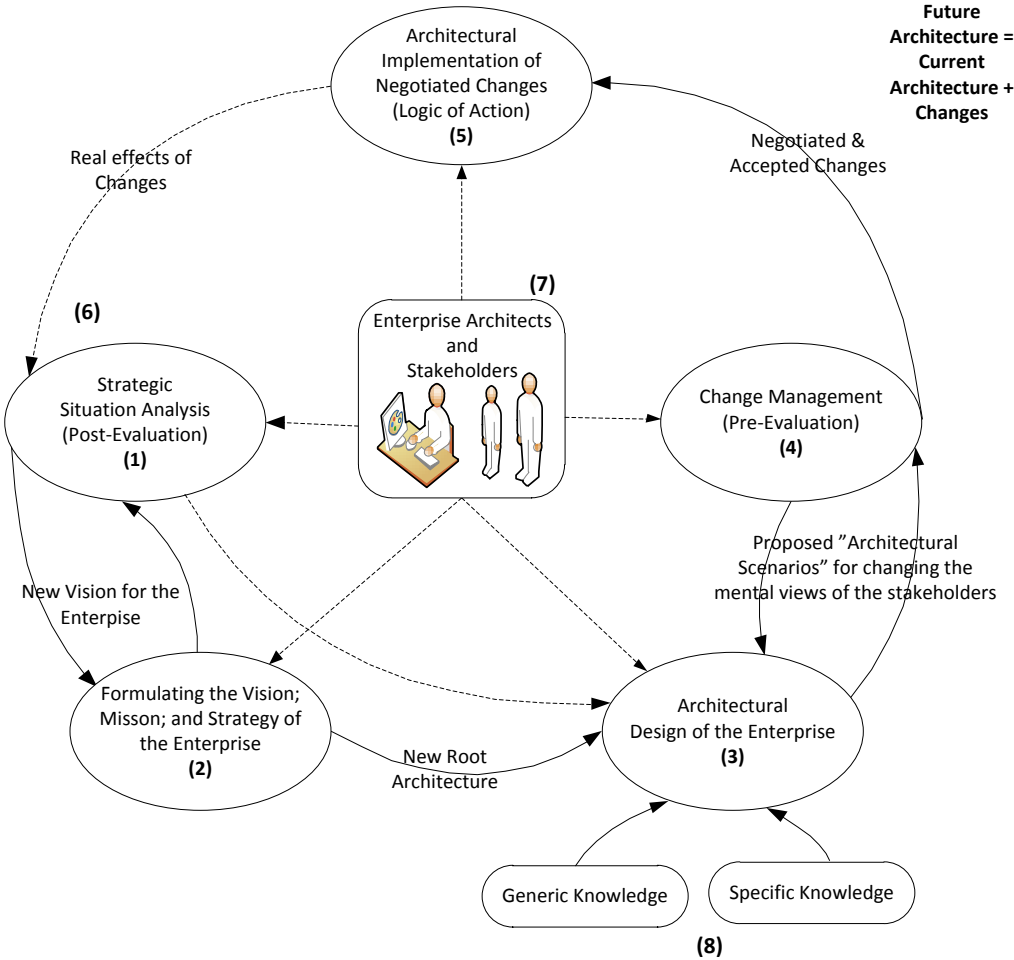
Figure 4: *Towards a sound theory of the PED Model*

As illustrated in Figure 4 above, the logical nature of our inquiry has been expressed by exhibiting the Enterprise Architect's role in carrying out strategic situation analysis; vision, mission and requirements; architectural design; change management; and architectural implementation. In addition, the model does not only depicts the Enterprise Architect's role but also the significant role played by the stakeholders in influencing all the specific five domains mentioned in the model which ultimately culminates into determining proactive enterprise development.

Mackenzie's rational approach has contributed towards the formation of our model especially in the domains of strategic situation analysis and architectural design as he advocates for the importance of having a clear strategy for organizational design with the use of design desiderata. Mackenzie also contributes towards our architectural implementation domain as he emphasizes the importance of implementing the design process.

Hedberg's approach has contributed towards the formation of the PED model particularly in the domain of architectural design by the various design stages of information systems. The domain of formulating the vision, mission and strategy of the enterprise has also been

impacted by Hedberg's approach as he advocates for change in the power structure through design in order to meet both organizational and people's needs. Hedberg also emphasizes stakeholders' involvement hence the impact of stakeholders in the formation of our model.

Checkland's approach has also contributed towards the formation of our model especially through the SSM were we have modified and substituted the system concept with the architectural concept instead. In essence, Checkland's model is evident in the domains of strategic situation analysis, formulating the vision, mission, and strategy and architectural design.

Since Tichy's integrated approach is a multidimensional as it combines the above mentioned approaches, it has also been instrumental in the formation of the various domains of our model.

The main concern of this thesis is to develop a model that can be used by the Enterprise Architect in a proactive enterprise development environment. By linking together different theories of enterprise development and Enterprise Architects' roles and competences in this work, we have designed a model that demonstrates the roles that Enterprise Architects should possess for enterprise development and how they impact enterprise development.

From this model, based on theory, we have created relevant research questions. In essence, the interview queries have been from the specific domains represented in our model for a proactive enterprise development. These questions have been designed in a structured format aiming to increase understanding concerning the roles and competencies of Enterprise Architects in proactive enterprise development. After the design of interview questions, we made arrangements to start with the interview process with the respective respondents.

2.2.3 Empirical Study

Our empirical study has been carried out by interviewing experienced respondents within the area of Enterprise Architecture in the four IT consultancy companies, namely: EVRY, Tieto, Sogeti Sverige AB, and Capgemini SE. Besides, the respondent who has worked with Capgemini is also a professional researcher in the field of informatics. With a qualitative method approach, the structured interviews have helped us draw comparisons of both similarities and differences from our respondents.

Our study is based the data collected in form of structured interview questions and the information collected from available literature. However, we do not aim to draw general conclusions about the Enterprise Architects roles, but rather seek to determine how individuals interpret and shape their reality. Although we have used structured interview questions, we have given to the respondent's space for their own answers as well. This gives our study qualitative features. We have had two open questions which gave our respondents the options to describe their own thoughts. Although we would prefer to interview more respondents, due to time constraints and difficulty in making appointments with a number of experienced Enterprise Architects, we were only able to interview four people.

2.2.4 Analysis of the Empirical Material

The analysis of our empirical material has been carried out by presenting the results from our various respondents in a table format. We have analysed the similarities and differences that exist between the empirical results in relation to our PED model in order to establish as to whether there is practical support for our model. Since the respondents were required to answer the interview questions by choosing from a scale of 1-5, we have used these answers given in a scale of 1-5 to facilitate our analysis.

2.2.5 Discussion of our Findings and Final Conclusions

Following the problem formulation, theoretical study, model formulation, and the empirical study, we then proceed to analyse our empirical findings in relation to our model. In essence, the discussion of our findings is derived from analysing the empirical results in order to identify any similarities and differences from the answers given by the various respondents thereby providing grounds for drawing some partial conclusions in relation the validity and reliability of our model. In our discussion, we have been able to identify the primary roles of an Enterprise Architect in the various domains that form our PED model. Our research work finishes with three main conclusions aiming at providing the answer to our primary proposal namely:

"What are the essential roles and competencies of an Enterprise Architect in relation to proactive enterprise development?"

2.3 Validity and reliability

Our study is based on a model which has been derived from proven theories; hence a model that can be said to be valid. Empirical data is collected in order to examine the kind of support that may be portrayed to the model. However, if the empirical data does not support the model, this does not mean that the model is incorrect but that further investigation should be done on the subject matter (Hedberg, 1978).

The quality of the proposed model follows the considerations made earlier by Jönsson and Hedberg (1978) pertaining to the model of research. In essence, the issues of model validity are derived from the distillation of existing models. Furthermore, the reliability of the model is derived from the comparison between the theoretical and empirical views of the proposed PED model. In essence, the proposed model was expected to provide a sound answer to our problem formulation and simultaneously satisfy the requisites of validity, i.e. the expected harmony and consistency between this proposed model and the existing theories. In the same way it must satisfy the requisites of reliability, i.e. the expected harmony/consistency between this proposed model and the real world of today. We believe that both criteria of quality have been satisfied to a reasonable degree.

Proposal for Future Research

As we have described earlier, the ultimate purpose of our study is to provide a sound ground for understanding the role and competencies of the Enterprise Architect in a proactive enterprise development. Furthermore, the meaningfulness of such education should be given in practical terms rather than in general terms.

A possible future project should concentrate and elucidate better on the relationship between the Enterprise Architect and change management. According to our study, there is not a clear harmony between the empirical and the theoretical views. This means that we have high validity but low or medium reliability. Perhaps investigation of the same question but with more representative respondents from different organizations and different departments and different responsible people can provide a more clear view of the various roles and responsibility of an Enterprise Architecture in that domain of activities.

Another possible future project can focus and elucidating the relationship between architectural design and architectural implementation in the context of a proactive enterprise development. The current idea that Enterprise Architecture has nothing to do with implementation is totally unacceptable. Therefore, such project must be based on a broad population of opinion. As it is today, there is a contradictory idea between architectural design and architectural implementation.

A last project has to do with the role of the Enterprise Architect as an agent of change. Here, the purpose is to elucidate what kind of technics or methods the architect must use in order to become effective in his/her communication of the possible future of technological or social changes in their impact of the enterprise because in accordance to our opinion, the concept of proactivity reflects the possibility to design and redesign the future from a long term perspective. However, we know that human and intellectual capacity is very limited and without formal technics and methods, the role of the Enterprise Architect as agent of change should be limited. Therefore, such a project should be geared towards trying to determine the kind of knowledge used by the architect in the area of the strategic situation analysis.

Lastly, our expectations have been based on the fact that this knowledge should be both theoretically and empirically valid, robust and reliable. Therefore, we expect in this section to indicate some future projects aiming at elucidating parts of our study that we believe should require more knowledge, hence a proposal for future research in those specific areas.

A brief background of our Respondents

In our empirical study, we have interviewed four different experts in the field of Enterprise Architecture who in turn represent four different IT Consultancy companies namely: Sogeti Sverige AB, Tieto, EVRY and Capgemini SE. We have chosen to categorize our respondents as follows:

Respondent A: Per Björkegren is currently working as CTO at Sogeti Sverige AB and he is considered to be Sogeti's notable guru within Enterprise Architecture and SOA.
Sogeti Sverige AB is a consultancy company specializing in local professional IT services. Geographically located to the local technical decision-makers of large companies, Sogeti Sverige AB is present at 21 Swedish locations with a total of 1150 employees. Globally, Sogeti employs over 20,000 employees in 15 countries. Sogeti Sverige AB is a part of Sogeti Group, owned by Cap Gemini S.A., listed on the Paris Stock Exchange (www.sogeti.se).

Respondent B: Lennart Idrestedt is working as a Consultant and Enterprise Architect at Tieto. Tieto is the leading IT service company in Northern Europe providing IT and product engineering services. Tieto's highly specialized solutions and services complemented by a

strong technology platform provide the company's local and global customers tangible business benefits. With about 18,000 experts, Tieto aims at becoming a leading service integrator creating the best service experience in IT. The company's shares are listed on NASDAQ OMX in Helsinki and Stockholm (www.tieto.com).

Respondent C: Jan Magnusson is working as a Business Analyst and Enterprise Architect at EVRY. EVRY is the largest IT Company in Norway and the second largest IT services company in the Nordic region. With over 10,000 employees, EVRY delivers daily IT services from 21 Norwegian and 50 Nordic towns and cities for more than 14,000 public and private sector customers. EVRY is the product of the largest-ever Nordic IT merger. EVRY is a result of the merger of Norway's two largest IT companies; EDB and ErgoGroup. EVRY is listed on the Oslo Stock Exchange where Norway Post and Telenor are company's largest shareholders (www.evry.com).

Respondent D: Mats-Åke Hugoson, Professor in Informatics, Jönköping International Business School, Sweden; Visiting professor, Department of Applied IT, University of Gothenburg, Sweden. Besides being an expert in the field, Mats-Åke Hugoson also represents Capgemini SE as an Enterprise Architect consultant.

Headquartered in Paris, France, Cap Gemini S.A. is one of the global leading companies in consulting, technology and outsourcing services with over 120,000 employees in North America, Europe, South America and the Asia-Pacific Region. Cap Gemini S.A. is listed on Paris Stock Exchange.

3. Theoretical Grounds

In this section, we start by addressing some of the fundamental roles and responsibilities of the Enterprise Architect as far as enterprise development is concerned.

3.1 Enterprise Architect

Although there are many kinds of architects, the IT Management field comprises of three main categories of architects as presented by Steghuis and Proper (2008). These include Enterprise Architects, domain architects and solutions architects. According to Steghuis and Proper, whereas the Enterprise Architect encompasses the scope of business and IT in an organization, the domain architects center on one specific portion of the enterprise such as business, IT, and information. Therefore, domain architects include business architects, IT architects and information architects. It is further argued that solutions architects focus on one small component of the implementation of the architecture such as applications, software, and business processes hence application architects, software architects, business architects, process architects, and so on and so forth (Steghuis and Proper, 2008).

Roeleven and Broer (2008) argue that the size of an organization has a significant impact on the kind of EA related roles. Furthermore, Roeleven and Broer (2008) are of the view that although relatively smaller organizations tend to generally use the information architect, for larger organizations the business architect plays a significant role. In other words, whereas small organizations approach EA from an IT stand point, larger organizations tend to have a more business-oriented approach due to more established Enterprise Architecture.

The emergence of enterprise architecture (EA) as a mechanism for addressing increased complexity has resulted in a newly evolving profession of Enterprise Architect. As enterprise architecture (EA) takes on an increasingly significant role in business management, new responsibilities are emerging within the organizational structure. One such role is the enterprise architect (Strano and Rehmani, 2007).

Staffing architecture teams requires defining the architecture roles and job descriptions to enable human resource management to determine the performance evaluation criteria, career paths, compensation plans, training requirements, and career progression criteria. EA is often used to refer to the technology architecture that spans the enterprise. In this context, the role of the Enterprise Architect may be basically the same as that of the systems architect except that the system is scoped to span the entire enterprise (Strano and Rehmani, 2007).

An Enterprise Architect has to articulate and understand the capabilities the organization has as well as the capabilities required to implement the business strategy. It's necessary to construct models and arguments, motivating and examining the capabilities, how they relate to one another and to the objectives of the organization, and what they mean in terms of what must be done to build them. Architecting the enterprise requires establishing a strategy, formulating a conceptual approach to achieving the strategy, and directing the execution of the concept to fulfill the strategic plan. The role of the Enterprise Architect changes with each of these stages and the effort required for each stage varies dependent upon the organizational type and skill sets of the architects (Strano and Rehmani, 2007).

Enterprise Architects are increasing their roles within the enterprise beyond that of advising the CIO on IT related issues. The Enterprise Architect is uniquely positioned to identify

investment opportunities that support the business goals of the enterprise while the CIO is typically attempting to ensure the return on investment for an IT investment. The CIO to assess the return on investment and total cost of ownership details uses this knowledge that best serve the capability requirement identified by the architect (Strano and Rehmani, 2007).

Given the interdisciplinary nature of enterprise architecture, the Enterprise Architect should have a general knowledge of various disciplines such as business strategy, financial management, organizational dynamics, business process design, and information technology. ''A good Enterprise Architect needs not only excellent technical skills, but business and behavioral competencies as well'. Strano and Rehmani (2007) discuss three distinct roles of the Enterprise Architect, as that of advisor, agent, and arbitrator. The architect advises the owner on how best to address business opportunities, solve business problems and allocate budget or invest capital. The agent deals with others on behalf of the owner when selecting methods and tools. The arbitrator remains impartial while enforcing the needs and requirements of both the builder and owner. The Enterprise Architect's most important function is balancing the disparate needs of people, management, and business requirements (Strano and Rehmani, 2007).

Roles and Responsibilities of enterprise architects

According to Straus and Doyle (1978), besides the traditional role of being a creative problem solver, an Enterprise Architect plays a significant role as a facilitator of problem solving by facilitating critical meetings and assisting in the design and management of the entire planning process which will in turn encourage a win/win solution and minimize both the win/lose and lose/lose decisions. This can be done by bringing people of different ideologies into the same room in order to produce a wide range of results from chaos to synergy (Straus and Doyle, 1978).

Magoulas and Pessi (2011) maintain that the Enterprise Architect connects the business mission, strategy, and processes of an organization to its IT strategy. This can be attained through documenting the above with the help of multiple architectural models or views that depict how the current and future needs of an organization will be met in an efficient, sustainable, agile, and adaptable manner.

In a research work done by Steghuis and Proper (2008) the responsibilities of an enterprise architect comprise of the creation, application, maintenance of an enterprise architecture as well as organizing the various processes involved during the enterprise architecting exercise.

During the design process of enterprise architecture, Steghuis and Proper (2008) maintain that the Enterprise Architect is expected to have a clear understanding of the purpose and context of the enterprise architecture as well as stipulating the necessary requirements in the design process. He/ she should also examine the enterprise's current situation and create shared conceptualization among the stakeholders involved in the development of that enterprise. The enterprise architect is further responsible for designing the processes, examining the effect of alternative enterprise architectures and communicating the results of the design process.

Besides the design process, the enterprise architect is also responsible for the application of the enterprise architecture in the organization. He/she is charged with the duty of informing the stakeholders about the selected EA and its motivations. The Enterprise Architect should support decision-making processes that are based on the EA. Furthermore, he/she should make sure that the development of the enterprise conforms to the architecture and that the EA results are made available to those concerned. The enterprise architect should re-communicate the EA and its impact to the relevant stakeholders (Steghuis and Proper, 2008).

According to Steghuis and Proper (2008), another responsibility entrusted with the Enterprise Architect is to ensure the maintenance of the enterprise architecture. This exercise can be carried out by monitoring the state of the enterprise and the stakeholders engaged in the development of the enterprise. The task of evaluating the various drivers for change both from within and outside the enterprise and the effort of updating as well as re-communicating the enterprise architecture are some of the roles played by Enterprise Architect in his/her EA maintenance endeavors.

Another vital role played by the enterprise architect is to organize the various processes that are carried out in enterprise architecting. This can be carried out in a number of ways such as organizing the enterprise architecture team, selecting frameworks, tools and ensuring that the enterprise architecture is treated as a means to an end and not an end in itself. In his/her organizing role, the enterprise architect is charged with the duty of administering the quality of the EA both as a product and a process. Furthermore, he/she has to set up the right leadership and to ensure that the architecture processes go through innovation with time (Steghuis and Proper, 2008).

According to the Center for Advancement of the Enterprise Architecture Profession (CAEAP), enterprise architects are expected to promote strategic and operational value of both the strategies and the operations of the enterprise. Furthermore, they make architectural assessments by translating the enterprise's strategies, visions, and goals into a holistic architecture thereby integrating the viewpoints of the various domains of interest in an enterprise. Enterprise Architects also minimize inappropriate complexity and alleviate risk to enhance architectural value for the enterprise.

Competencies of various architects

Although there is a wide range of competencies that accrue to a number of architects, we have chosen to consider the following in relation to our thesis:

According to Steghuis and Proper (2008), there are relevant competencies to the assignment of the various architects although not all such competencies are appropriate to each of the roles played by architects. In other words, a good Enterprise Architect has to be a jack-of-all-trades, as argued by Steghuis and Proper (2008). In their research on the theme, they categorize competencies into both professional and personal competencies.

On one hand, with regard to professional competencies, the architect is expected to be knowledgeable about the business, information, information systems, and the organizational infrastructure although he needs to be an expert in at least one area. According to Steghuis and Proper's research, TOGAF separates the professional capabilities in their architecture

skills structure into business skills and methods, enterprise architecture skills, project management skills, IT general knowledge skills, technical IT skills, and legal environment.

Moreover, architects need to be knowledgeable about the various domains, architecture principles, architecture frameworks and governance as well as keeping abreast with regard to any new developments in their field.

On the other hand, the following are some of the personal competences of an Enterprise Architect as presented by Steghuis and Proper (2008):

- Analytical skills entail the architect's ability to identify a given concept or challenge, to scrutinize its components, to organize information for decision making and depict appropriate conclusions on the subject matter.
- Communication skills play a significant role in the work of an architect and they can further be viewed as both oral and written according to Steghuis and Proper (2008). Whereas oral communication skills refers to the ability to use appropriate technical or business language in a bid to express thoughts and feelings in a summarized manner and to respond adequately to others, written communication skills is the ability to write clear and precise reports, letters and relevant documents that can be easily interpreted by those concerned.
- Abstraction capacity is the architect's capability to learn in new situations and to adapt the acquired knowledge and data, rules, principles to the new spheres of influence.
- Creativity in this context refers to the architect's ability to produce creative ideas and solutions, discover new ways of conducting business and being open to new information related to his/her field.
- Flexibility is the ability of an architect to handle and respond to change in the conditions, environments, theories, leadership, and so on and so forth.
- Persuasiveness is the architect's ability to influence others regarding a particular outlook on the subject matter.
- Sensitivity and empathy refers to the combination of the architect's capabilities in detecting other people's feelings and taking an active response regarding their concerns on a particular issue.
- Organizational awareness refers to the architect's ability to grasp the various functions of the organization and being able to estimate the impact of his/her decisions or activities on such functions.
- Leadership ability refers to the architect's ability to inspire and lead people towards a specific direction in order to achieve a given set of goals and objectives.
- Being result oriented in this context refers to the architect's ability to realize goals in light of the specific strategies set by the enterprise.
- Teamwork simply refers to the ability to cultivate a team spirit through working with others towards achieving shared goals and creating group synergy in pursuing these goals.

It should be noted that the qualities that should characterize what might be considered to be an able and wise architect vary from architect to architect and from organization to organization. Nevertheless, Steghuis and Proper (2008) assert that the role of Enterprise Architect requires leadership qualities, a deep knowledge of IT and business domains together with ample communication skills.

3.2 Organizational/Enterprise Development

In this section we present the theories, models and techniques related to organizational concepts and organizational development. These aspects have helped in creating our own model which clarifies the Enterprise Architects roles and competencies in proactive organizational development. Our model is based on the existing models presented by Mackenzie (The rational model), Hedberg (The socio-political model), Checkland (The socio-cultural model) and Tichy (A model that advocates an alignment between the preceding three models). These models describe how organizations evolve from different perspectives. We have also gained some inspiration regarding the above four approaches from an earlier research work done by Gunther and Jaworski (2004) in their thesis.

The above approaches have facilitated the formation of a holistic model in order to clarify the architect's roles in a proactive enterprise development context. Whereas Mackenzie's (1984) framework is rational and structural in nature, Hedberg's approach has a political perspective with a focus on goals and stakeholders. On the other hand, Checkland's Soft System Methodology (SSM) approach focuses on processes and stakeholders. Therefore, in order to ensure implementing change with a positive effect on the organization, it's important that we look carefully into all these aspects. Tichy (1983) integrates all the above three dimensions as he emphasizes their importance in carrying out change within an organization. Whereas the above three approaches are one-dimensional, Tichy's approach is multi-dimensional.

3.1.1 The importance of the three approaches

In the three models that we described above, both common and distinctive features are found. The common features are:

- All the three models are learning models based on "the Law of ignorance", that is to say, no one model can master all the consequences. There is evidence of better control based on experience but this is not enough. Therefore, in order to ensure continuous development and improvement, the organization must be in a state of constant learning (Magoulas, 2004).
- All the three models advocate for proactive development, i.e. development that gradually progresses, where factors in systems development, organizational development and knowledge development go hand in hand in a synchronized manner.
- All models are designed to improve business performance in general and business information systems in particular.
- All models clarify the Enterprise Architect's role in organizational development, but from different perspectives.

The last point is important because we want to conceptualize the model that illustrates the Enterprise Architect's role in proactive enterprise development.

Blixt and Svärdström (2002) claim that the three models presented by the theorists do consider the organization as a whole entity and that an organization is always confronted with change and continuous learning. The organization's goal is to keep the stakeholders together and its activities must therefore aim at achieving the stakeholders' diverse and changing goals in the most effective way.

The different characteristics we identified in the models are:

- Mackenzie (1984) focuses on the organizations' rational sustainability. The model he describes tackles the organization from a rational perspective. The model may play a crucial role in the development and creation of understanding about the organization. If the client accepts the models, this will become a social contract. These models will be functional only if they are objective and specific. For this purpose, Mackenzie (1984) created the desiderata, which we described earlier.
- Checkland (1995) focuses on organizations' cultural sustainability. Clarification of the common worldview, goals, norms and values that exist within the organization is essential in helping to understand and develop an organization. Although Checkland's (1995) model focuses on the cultural part of an organization, this does not imply that the rational part is forgotten. Checkland (1995) argues that the rational and the cultural approaches must be in harmony in order for an organization to succeed.
- Hedberg (1980) believes that knowledge and culture are necessary but not sufficient. According to Hedberg (1980), an organization that gives priority to the success of someone else does not succeed in the long run. Although Hedberg (1980) recognizes the importance of a strong culture and is aware of the need for an expert in the change process, he maintains that the most critical factor for successful development is stakeholder's involvement.

3.1.2 The rational model

Mackenzie (1984) has developed a framework that explains how organizational development should be undertaken. He believes that over the years, awareness has developed regarding the importance of analysing the environment; the use of financial resources; the implications that objectives and strategies provide; the choice of methodology; and the understanding of the informal psychological and social aspects. An idea about the organizations' complex nature begins to emerge. Mackenzie (1984) argues that organizational design is an on-going adaptation to the objectives and strategies, management of technological resources and the implementation of these together with the efforts to achieve the desired results in the ever-changing environment. It takes a number of desiderata to evaluate this adaptation to theory and methodology from an organization's side.

Strategy for organizational design

Organizational Design affects the structures of an organization and the tasks done. A structure represents a need for a satisfactory pattern of interaction between members of a group. Therefore, knowledge of how processes and group structures affect each other within the organization is very important and central to the development of a theory and methodology for organization design. Organization design is seen as a kind of survey. When the introduction of the design is done, change happens. The design will be thinking and implementing the action itself. In order to manage these processes and structural changes, a strategy is required. The basic strategy presented by Mackenzie (1984) views each organization as a study in the development of a theory of organizational structures.

The strategy comprises of the following five components:

- Develop a conceptual / theoretical model.

- Develop methods for applying the theory to the real organization
- Use these advanced methods in the change process to design the actual organisation
- Analyse and evaluate the results that emerge and the processes in each application
- Identify areas of improvements in the conceptual model and methods
- Refine the theory
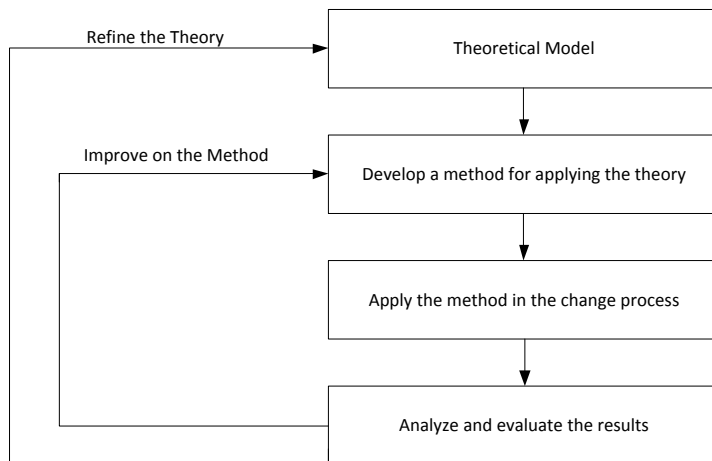
Figure 5 *Strategies for Organizational Design (Adapted from Mackenzie, 1984)*

This strategy is similar to many other theoretical-development strategies. It is important to note that the process is iterative and the steps can be repeated continuously; hence it is a learning process. Another important factor in strategy creation is that the client organization's interests must always prevail over the designer. The client should be constantly kept informed of progress of work and should have access to information concerning methods and their applications (Mackenzie, 1984).

Desiderata
The desiderata or requirements described for designing an organization fall into three broad categories:

- Desiderata of the design process (1-5)
- Desiderata of the design outcome (6-9)
- Desiderata for implementing the design (10-13)

According to Mackenzie (1984), the design process comprises of the following category of Desiderata:
- Agreement regarding the process to be followed rather than the results to be achieved;
- Completeness of analysis;
- Cost effectiveness of the design process;
- Objectivity of the design process; and
- Speed during the design process.

According to Mackenzie (1984), the second category of Desiderata design outcome should entail the following Desiderata:
- Fewer restructuring processes are preferable;

- o Simplicity of the organization design;
- o Accuracy of the organization design;
- o Carefully drafted organization design;

According to Mackenzie (1984), the following Desiderata should be emphasized while implementing the design process (10-13):

- o Implementability;
- o Easy maintenance and update capabilities;
- o Influence of the organizational design;
- o Reduced organizational dependency on the designer.

Note: Refer to the appendix 1 for a detailed description of the above mentioned Desiderata.

3.1.3 The socio-cultural model

Before Peter B. Checkland began to research at the University of Lancaster in England at the end of the 1960s, he worked at ICI Limited and was a part of what in the system design is called for the hard approach. With his research, Checkland focused more and more towards the soft approach in system development. With the Soft Systems Methodology approach which Checkland developed with his colleagues, they together found a way to combine the hard systems thinking with a model from the soft systems thinking (Checkland and Howell, 1998).

The hard approach

Checkland and Howell (1998) define the hard approach of the information system (IS) development organizations as formal social entities which would set different goals and then try to achieve them. The social world consists of systems whose performance can be optimized. Checkland and Howell (1998) argue that functionalism is a typical example of a hard approach that is dominant in the development of IS.

A systems engineer in the hard approach chooses to see the world as a variety of systems and works under the assumption that it is easy to know how the systems that are developed should be designed. Various alternative models are created and specific criteria are used to choose between such models. However, the social world is considered to be resistant to this approach (Checkland and Howell, 1998).

An organization is seen as an open system consisting of a number of functional subsystems. A manager belonging to these social systems is seen as a problem-solver and the first task of a problem-solver is to make decisions. These decisions consist of a process to identify problems, identify alternative solutions and then choose to implement one of such solutions. The decisions in accordance with this methodology are not optimal but "good enough" under the circumstances. These circumstances are the ones that make the decision to be in line with the decision maker's goals. Information systems are viewed from the hard school perspective as a tool used to facilitate decision-making (Checkland and Howell, 1998).

When inquiries are made to obtain new information, it is based on the hypothesis testing, preferably quantitative if possible. This strong tradition is based on the positivist philosophy

and on functionalism as a social theory according to Checkland and Howell (1998).

The soft approach

Checkland and Howell (1998) argue that the soft approach is based on the fact that all problem situations that are handled by managers in the world have at least one thing in common, they consist of people who are trying to carry out goal-oriented actions. However, the soft approach does not focus on goals but on managing relationships. The core of a soft approach is to debate on the various possible routes one can take, and how they are going to affect the relationships of those involved. It should be noted that it is the managers who set up standards or norms rather than goals under this approach (Checkland and Howell, 1998).

Soft Systems Methodology (SSM)

The Soft Systems Methodology (SSM) has been developed by Checkland (1995) and it can be seen as a cross section between a philosophy and a working technique or method. SSM helps in exploring and creating a picture of how a current system looks like with its associated challenges and how such a system can be improved upon. Checkland (1995) also advocates for a structured debate in which all actors in a given research project get involved and choose to discuss based on the debate foundation. This is assists in obtaining insight into the problem situation within a specific investigation. The difference between methodology and method is that a methodology does not follow fixed or specific rules (process steps). A methodology is rather organized by principles instead of specific steps or rules (Checkland, 1995).

SSM is useful in dealing with complex problem situations particularly where human activity is evident. The good thing about this methodology is the recognition of the people and their various roles within a given system as a significant factor in the analysis of a problem situation (Checkland, 1995).

It should be noted that SSM is a structured approach that can be used to find the best solution in handling complex issues and diffuse problems. Furthermore, SSM places a great emphasis on trying to find the underlying goals, worldviews, and applicable standards. Another important aspect of SSM is the desire to take up as many different problem perspectives as possible in order to get a good picture of the problem's identity. The greater the understanding about a problem situation by a given group, the better it will be solved. SSM is a methodological approach to tackle real problems and is intended to be used at all levels of decision-making; from business decisions to everyday decisions. The goal is not really to seek for the ultimate solution to problems but to try to solve the problems that exist in the best way possible. SSM is not explicitly designed to address well-defined technical problems in organizations, but the focus is instead on the unstructured problem situations that all managers must handle. According to Checkland (1995), SSM is divided into seven working steps that should be followed iteratively. These steps are as follows:

- Development of information about the problem situation
- Expressing the problem situation through Rich Pictures
- Choose how the situation should be considered and produce root definitions
- Building conceptual models
- Comparing the conceptual models with the real world
- Identify possible and desired changes

- Suggestions on how to proceed in order to improve upon the problem situation

It is the problem to be solved that will determine how thoroughly each of the above steps should be performed. Furthermore, the steps don't need to be conducted or followed exactly as stated in the above order. Consequently, it is also possible to leave out some of the steps aside as desired depending on the situation at hand. Thus, SSM is an open methodology which is adaptable to the any given situation that a user of such a methodology may be in at any given point in time (Checkland, 1995). The seven stages of SSM are as follows:

  o Identify the problem situation
  o Express the problem situation
  o Root definition
  o Conceptual Models
  o Comparison of the model with reality
  o Identify the desired changes
  o Implement the desired changes

Note: Refer to the appendix 1 for a full description of the SSM stages by Checkland (1995).

3.1.4 The socio-political model

According to Hedberg (1980), knowledge about technology impact on people has literally driven the industry forward since the birth of industrialism. The development of machinery did also influence the development in the knowledge of humans and machines and organizations were developed to provide better working conditions for people. Computers and information technology have also undergone the same development trend. According to Hedberg (1980), IS-design has undergone several phases as shown in the model below:

	Assignments	Target	Organizational Design (Change)	Designers
Stage 1	Designing IS	Utilize new technology	As a surprise	Pioneers
Stage 2	Carefully designing IS	Minimize the social impact	As a mistake-not consciously	Tailor
Stage 3	Deliberately designing IS	Change organizations	Consciously	Change Agents

Table 2: *Stages in IS Design (Adapted from Hedberg, 1980)*

These three maturity stages reveal that increased understanding of the technological impact on people and organizations can lead to more responsible IS-designer, broadened perspective for understanding the organizations' role in system development, and new roles for Enterprise Architects.

The fourth phase presented by Hedberg (1980) in table 2 below shows how he yearns for the future of information systems to be designed. According to Hedberg (1980), this phase can be considered as utopian and therefore does not exist today (with today he meant the time when

the article was written. However, we choose to consider this phase as utopian anyway)

	Assignments	Target	Organizational Design (Change)	Designers
Stage 4	Designing IS with the participation of stakeholders	Creating a learning organisation	Self-designed; constantly evolving	Non-existent- (redundant)

Table 3: *Stage for the future IS Design (Adapted from Hedberg, 1980)*

According to Hedberg (1980), new technology tends towards increased autonomy within organizations. This autonomy means that each working group can create their own work structures and responsibilities within the group with the help of IS. Consequently, each working group within the organization will receive a greater autonomy and self-governance with the help of IS which in turn leads to increased influence of the employees at the workplace.

Hedberg (1980) argues that in order to ensure the realization of the desired effect from the introduction of the IS, it is important for the designer to be involved and to understand the impact of technology on the organization. Furthermore, it is vitally important to ensure that the end product becomes a social system that is developed by conscious designers with employees and management. According to Hedberg (1980) the concept of quality cannot be defined generally but must be determined based on the organization's current experiences and opinions. The leadership and expertise of designers is required in order to achieve high quality in a design process and these two must be in balance. Hedberg's (1980) interpretation of high quality is a system that is not very long-lived. A designer's job is not to build system palaces but designers should instead encourage change rather than stability and dependence.

According to Hedberg (1980), there are three major barriers to achieving a higher level of system designs that are better suited for the people affected by the change. These are:

• The education system is not designed in such a way that supports understanding of how people and organizations are affected by the introduction of IS. There are not enough courses in the IS/IT programs that involve organizations and people.
• Books, articles and papers within the subject tend to put emphasis on guiding designers in their work. This literature is not much concerned with the influence of technologies on organizations and people.
• Designers are only designing to satisfy those who reward their efforts of the performed work. Designers working with existing techniques, time frames and budgets. The decision makers who control the designer's work do not sufficiently pay attention to human needs, organizations, and user participation.

According to Hedberg (1980), in order to design better IS, the solution to the above problems should entail a change in the concerned educational programs, changes in the power structure within organizations so that people's needs and values have an important role and the amendment of the reward systems which encourage designers to work towards meeting both organizational and people's needs. In addition, Hedberg (1980) advocates for a participative

design approach which encourages stakeholders' involvement throughout the process as exhibited in the model in figure 7 below:
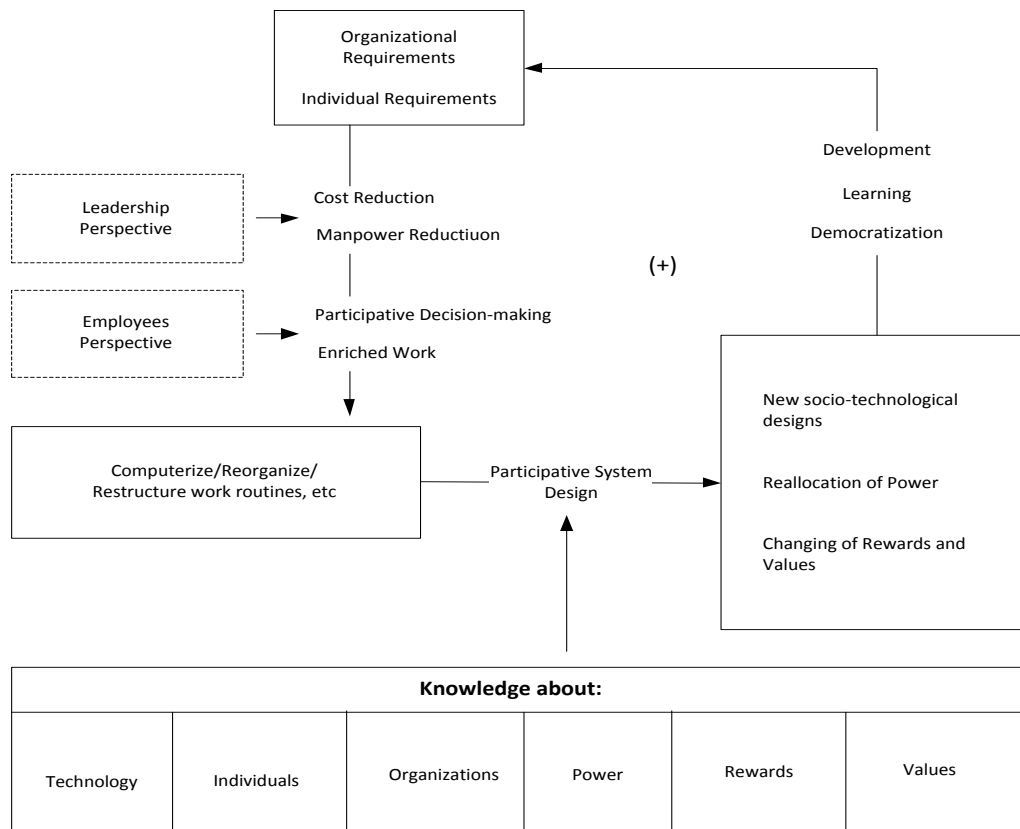
Figure 6: *Participative System Design based on management and employees perspective (Adapted from Hedberg, 1980)*

Hedberg (1980) summarizes his theories in the following points:

- Computer systems can be used to design improved organization and working conditions.
- Knowledge pertaining to how computers impact people in their work and within their organizations is necessary in order to create better designs.
- As long as the management's perspective still dominates the definitions of problems, what is to be designed and the rewards to be awarded, then organizations are bound to improve based only on the management perspective. Nevertheless, management's perspective should be incorporated into other stakeholders' perspectives and design must be produced in a participatory process.
- Socio-technological designs are not sufficient. In order to ensure a lasting change, values, reward systems and power structures must change as well.

System designers should increase their understanding of what their work means to the organization and the people involved. As of necessity, the system designer must, in the future, assume the role of a catalyst and a partner in the change process (Hedberg, 1980).

3.1.5 The integrated model

As we described above, there are different approaches within the organization that are

necessary in any development process. These are: the socio-political (Hedberg), the socio-cultural (Checkland) and the rational (Mackenzie) models. If change is going to have a positive effect on the organization, it's necessary to take a closer look into all these aspects. Tichy (1983) maintains that all the preceding three approaches are relevant over time. However, according to Tichy (1983), emphasis can be put on one of the approaches or a combination of the approaches at specific time frames during the enterprise development process.

Tichy (1983) illustrates how these three systems can work in harmony during a 10-year period by showing an example on his study research. The Dr. Martin Luther King, Jr. Health Centre (MLK) is a medical centre in the South Bronx, New York, USA. South Bronx is part of New York with major social problems such as slums, high unemployment, low education, crime, and drug abuse. All these problems have led to the MLK to become a more complex and socially active part of the area than what a medical centre in a more stable society should be. MLK has become known for trying new ways and letting the citizens of South Bronx to shape the organization in every way, even at management level.

In the example of MLK, the research describes the development of a 10-year period, which in turn is divided into four phases. These stages are not meant as phases of development and are designed to describe the activities that took place within the organization and which systems had the highest priority for change. Phase titles are created to reflect the primary activity during the period (Tichy, 1983).

Phase 1: The Beginning

During the initial phase, the cultural system had a dominant role. During the mid-1960s, resources were used to build a health centre close to where people lived. Since the area where MLK was being built was an area associated with major social problems, it was very important to find an ideological foundation that could be shared with the residents in the area. The promoters created an alliance with local leaders to bring about a common set of values to stand on. During this phase, there was much uncertainty within the political system. After the initial work, conflicts in the leadership structure emerged after about two years of work on verification and questions about nepotism. This led to giving a more prominent role to the development and change of the political system. The major focus of the cultural and political system meant that the technical system had a modest role in this phase (Tichy, 1983).

Phase 2: System Development

The second phase of development at MLK was dominated by leadership development processes. A lot of money and time were invested in developing systems and procedures. What was sought after at this phase included a need for more leadership structures, work, among others. Apparently, the characteristics that had led the development of MLK forward in the first phase (experimentation, creativity and entrepreneurship) became an obstacle to further development at this phase. Consequently, seeking expertise from outside was a necessity in order to ensure the required change. The said expertise was provided by Professor Richard Beckhard at MIT's Sloan School of Management as he helped MLK through introducing a new organizational design and new structures for leadership. These changes meant that the confusion about culture and leadership reduced dramatically. The significant increase in efficiency where cultural and political systems were concerned meant that greater focus could then be placed on developing the technical system (Tichy, 1983).

Phase 3: Stabilization and unification

This phase gave MLK the opportunity to test the implemented technical systems and make changes where necessary. There was a remarkable decrease in the attention to cultural issues as stakeholders in this phase were more focused on their job, career and technical change, that is to say, the technical and the political system attracted more attention. During this stage, there was a requirement to hand over the leadership of MLK to the municipal board which in turn resulted into further changes in management and organization and also increased the need for change in the political system (Tichy, 1983).

Phase 4: Renewal

While the leadership was changed, MLK had tremendous pressure from outside to increase its cost-efficiency and in addition, the government funds which largely covered the losses of the organization had declined at this juncture. This meant that both the political and the technical system required a lot of attention at the same time. In a situation like this, where two systems demand a lot of attention and work, it is the duty of management to decide on what kind of activities that should be initiated in both systems simultaneously, or if any of the systems should be considered as a priority. Both systems required a lot of attention while putting the enormous pressure on the organization. Supposing all three systems had the same needs at the same time, the survival of the entire organization would be threatened (Tichy, 1983).

Tichy (1983) asserts the relevance of taking into account all the systems that are a part of an organization. In the example MLK clarifies clearly the necessity of a continuous development of all systems to enable the organization to change in a positive direction. Furthermore, Tichy (1983) argues that if the multiple systems are neglected for a long time, this will result into unwanted consequences.

Without directly referring to either Checkland (1995), Mackenzie (1984) or Hedberg (1980), Tichy makes an analysis that clearly illustrates how important it is to take into account all the three theories that we have previously described. Tichy's (1983) example of MLK shows that the three theories must be used together if a holistic picture of the organization and changes is to be given.

4. A model for Proactive Enterprise Development (PED)

The primary purpose of using models in various situations is to review and analyze the reality in a satisfactory manner since we live between two worlds; the model world and the real world which can be mirrored or represented by the model (Holme and Solvang, 1997). Therefore, our PED model is intended to mirror the role of an Enterprise Architect in a proactive enterprise development context.

In this section, we present the steps we have taken in formulating the model for proactive enterprise development. This model can be used to address both continuous and discontinuous organizational development and it has been derived from well-grounded organizational theory in enterprise development as proposed by Mackenzie (1984), Checkland (1985), Hedberg (1980) and Tichy (1983). The approaches presented by the preceding authors include the rational, socio-cultural, socio-political and the alignment approaches respectively.

We present an overview of the PED model and then proceed to outline and describe the process of proactive enterprise development by elucidating on the fundamental components embedded in our model.

Figure 7: PED Model

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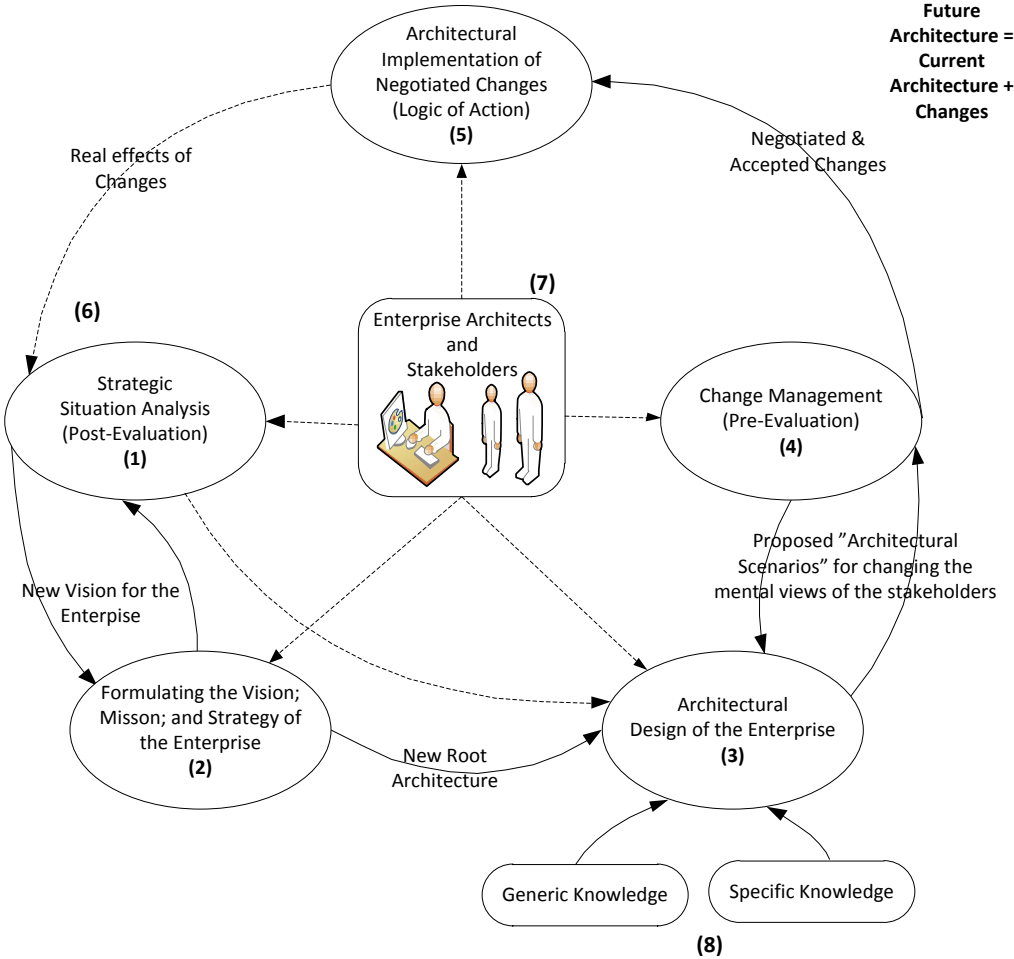
Figure 7 depicts the PED model and it incorporates the various domains and the relationships that exist between the domains as shown above. In addition, figure 7 includes both generic and specific knowledge of the Enterprise Architect which is instrumental during the architectural design phase.

4.1 An overview of the PED model

The initial phase of the PED model is referred to as the Situation Analysis and it includes the work of preparing those who should be involved in the change process including their opinions and thoughts regarding the current and future business of the enterprise. The second phase is concerned with the formulation of the Vision, Mission and Strategy of the enterprise and it is also referred to as the root architecture of the enterprise. The third phase, in this model is called Architectural Design of the enterprise which can be based on either the current root architecture or new root architecture of the enterprise. This phase involves the methodical efforts to develop various proposals for change. All of the above mentioned theorists use the same criteria for carrying out this work. Change Management is the fourth phase in our model and it addresses what should be done in reaching a decision regarding the negotiated and accepted changes. The last phase is called the Architectural Implementation phase which entails the architectural implementation of the negotiated changes. After the implementation has been carried out, and the real effects of change have been experienced, the model will continue further back to the strategic situation analysis. It is at this stage that an evaluation of the changes on the entire operation should be carried out. Our theoretical study has contributed to our understanding of the various roles and competencies of the Enterprise Architect in each stage of the PED model.

The PED model comprises of the following domains of activities:

1. Strategic situation analysis

2. Architectural design

3. Change management

4. Architectural implementation

5. Strategic situation analysis (post-evaluation)

6. Vision, Mission and Strategy

7. Extended architectural design with respect to generic and specific knowledge

8. Enterprise Architects and stakeholders

The construction of the PED model has gone through two successive stages as depicted by figure 7 above. The process begins by carrying out the strategic situation analysis and then proceeds to architectural design after identifying the proposed areas for improvement related to the vision, mission and strategy of the enterprise. Moreover, change management which is the next phase in the model where pre-evaluation is evident, can be facilitated by optimal models for creating awareness and shared understanding (descriptive and planned architectural models). Consequently, the next stage is architectural implementation where the implementation of negotiated and accepted changes is carried out following mutual

acceptance of the change process during the change management phase.

After the architectural implementation phase, the next phase is to return back to the strategic situation analysis in order to evaluate and create an understanding about the inevitable effects of changes experienced as a result of the implemented architecture. Consequently, this might necessitate making recommendation for the new cycle of development by carrying out another strategic situation analysis. If a new purpose or mission for the enterprise is identified, this will result into identifying new expectations, values, goals, vision and requirements. Therefore, this will eventually lead to the next phase which is the creation of vision, mission and strategy of the enterprise. The need for creating a new root architecture hence, changing the existing architecture will follow suit. The relationship between the vision, mission and strategy domain and the architectural domain is represented by disclosing the new identity which literally necessitates the need for an architectural design.

Figure 7 above illustrates the impact of both Enterprise Architects and stakeholders on the five main domains of a proactive enterprise development process. In essence, Enterprise Architects and stakeholders play a significant role by influencing the activities that take place during the strategic situation analysis; vision, mission and requirements; architectural design; change management; and architectural implementation processes hence, impacting the proactive enterprise development process.

4.2 Outlining the process of proactive Enterprise Development

This section outlines the process of proactive enterprise development by expounding on the specific domains of the PED model. In essence, we describe the said domains which include the strategic situation analysis; vision, mission and strategy; architectural design; change management; and architectural implementation. Furthermore, it is in this section where we integrate the four different dimensions i.e. the rational, socio-political, socio-cultural and the alignment approaches from which we have been able to derive the PED model.

4.2.1 Strategic Situation Analysis

According to Checkland (1985), it is important to carry out an assessment of the current situation of the enterprise during the situation analysis. It is a statement which describes the details of the current opportunities or problems that the organization faces. It is very important to investigate the recourses that already exist with the existing systems and how earlier decision-making was done (Checkland, 1985; Mackenzie, 1984; Hedberg, 1980). It is very important to identify the stakeholders and to ensure that all stakeholders participate in the process in order to evaluate the effects of the current situation (Checkland, 1985).

Mackenzie (1984) affirms that a strategy is always necessary when developing a technology and a theory to design an organization. A decision on strategy (top-down or bottom-up) is also taken at this stage depending on the nature and the scope of the project (Mackenzie, 1984).

It should be noted that one of the main outcomes of the strategic situation analysis is an architectural concept (root definition) which also seems to represent the present situation of the enterprise (as is). The architectural concept (as is) is a description of the present situation

i.e. the current strategy and a description of a new architectural idea for the future. In other words, the architectural concept is the stakeholders' dreams and architectural requirements (Checkland, 1985; Smith, 1999).

This stage is what Walker (2007) refers to as the envision phase. During this phase, some critical processes determine both the course of the application assets and the project that are to be purchased or developed. These processes are related to how the solution should be architected, how it will fit into the environment, and whether an organization should build and buy, or buy and customize a solution. This is a critical stage for an Enterprise Architect to provide input before in-depth vendor management occurs if vendors will need to be selected (Walker, 2007).

In their study, Strano and Rehmani (2007) maintain that an Enterprise Architect should seek to understand and articulate the capabilities that the organization has as well as the capabilities required to implement the business strategy. The Enterprise Architect needs also to construct models and arguments, examining and motivating the capabilities, how they relate to one another and to the objectives of the organization, and what they mean in terms of what must be done to build them (Strano and Rehmani, 2007). Architecting the enterprise requires formulating a conceptual approach to achieve the strategy, directing the execution of the concept to fulfil the strategic plan and establishing a strategy. The effort required for each stage varies dependent upon the organizational type and skill sets (Strano and Rehmani, 2007). It has been argued that the role of the Enterprise Architect is multi-dimensional. There are no single roles but, rather, there are many roles, which were abstracted into five categories that the Enterprise Architect needs to carry out in the stages of organizational development. In the situation analysis stage, one of the roles is as a change agent. As a change agent, the Enterprise Architect supports enterprise leaders by promoting and establishing the best strategy to accomplish business objectives and goals (Strano and Rehmani, 2007).

Furthermore, the research presented by Strano and Rehmani (2007) deals with the broad categories of functional interfaces for the Enterprise Architect which include capital investment planners, business strategists, functional groups, external stakeholders, other architects, program/project managers, oversight officials, and senior executives. The Enterprise Architect must basically interface with everyone in the enterprise who needs to have a clear understanding of the strategic direction of the enterprise and the plan of execution to move the enterprise in that direction and at the same time the Enterprise Architect interfaces also with anyone outside of the enterprise who has a stake in the enterprise's outcomes (Strano and Rehmani, 2007).

At the situation analysis stage, the Enterprise Architect interfaces with business strategists including strategic planners, mission communities, business analysts, and members of executive steering committees for helping them how to better understand and formulate the strategic vision of the enterprise. The Enterprise Architect helps for instance members of the capital investment review boards in order to establish priorities, and he does this by gaining an understanding of the interdependencies of the infrastructure to the mission goals. Enterprise Architects interface also with external stakeholders including businesses, citizens, and other government organizations to make sure that their interests are represented adequately in the Enterprise Architecture and for collaborating to optimizing the architecture to best serve their collective needs. Decisions are made through the governance structure (Strano and Rehmani, 2007).

Ellinger (2009) argues that during the situation analysis stage, Enterprise Architects should endeavour to identify changes in the Enterprise Architecture in order to meet the organization's changing business requirements. That's why it's important to build a record of good IT investments decisions based on Enterprise Architecture which must be done through defining clearly the current Enterprise Architecture, maintaining the currency of the Enterprise Architecture and identifying disruptive technology (technology that either provides organizational opportunities or challenge the organization). The Enterprise Architect should have a good understanding of both the customer's requirements and the system architecture so she can determine the linkages among the layers of the Enterprise Architecture (Ellinger, 2009).

With reference to table below 3, Bredemeyer (2002) points out the importance of politics and stakeholders when developing a change and summarizes what the Enterprise Architect should know, should do and should be, when it comes to politics during the situation analysis stage (Bredemeyer, 2002).

Strategic Situation Analysis		
What the Enterprise Architect knows	What the Enterprise Architect does	What the Enterprise Architect is
• Recognizes the need for buy-in and support decisions	• Establishes good working relationships. • Keeps relevant people informed of actions and decisions and progress.	• See what needs to be done and does it without being told.

Table 4: *What it takes to be great in the role of Enterprise Architect from the situation analysis perspective*

Van der Raadt and Van Vliet (2008) forward another viewpoint about the activities of an Enterprise Architect at this stage by providing a fragmented picture of Enterprise Architecture function. They describe the three main responsibilities of the Enterprise Architecture function: (1) Enterprise Architecture decision making, (2) Enterprise Architecture delivery and (3) Enterprise Architecture conformance. At the enterprise level, the Enterprise Architecture delivery function usually consists of a central Enterprise Architecture team, which should be comprised, of an Enterprise Architecture manager, the chief Enterprise Architect, and various architect roles. The chief Enterprise Architect acts typically as the functional lead of the Enterprise Architecture delivery function, overseeing all aspect areas of the Enterprise Architecture. Furthermore, the Enterprise Architect acts as a trusted advisor to the CTO and is responsible for the effectiveness and quality of the overall Enterprise Architecture Van der Raadt and Van Vliet (2008).

Van der Raadt and Van Vliet (2008) identify four types of responsibilities of the Enterprise Architect during the EA delivery phase as depicted in figure 12 below. These include the following:

1. To provide advice to support EA decision making
2. To validate EA conformance and handle waiver requests
3. To create and maintain EA products
4. To provide support in applying EA products

EA decision making

Ratify EA products	Handle EA escalations

EA delivery

Provide advice to support EA decision making	Create & maintain EA products
Validate EA conformance & handle waiver requests	Provide support in applying EA products

EA conformance

Conform to EA products	Provide feedback On EA products	Escalate EA exceptions
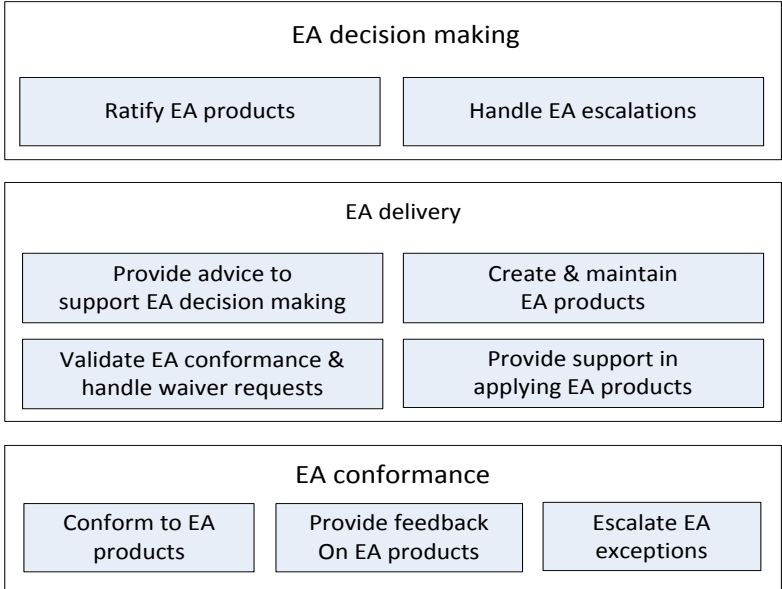
Figure 8 *Responsibilities of the three main Enterprise Architecture functions (Van der Raadt and Van Vliet, 2008)*

According to Van der Raadt and Van Vliet (2008), the first type of responsibility related to the situation analysis stage in the organizational development model is to provide advice to support EA decision-making regarding the target architecture. This can be done by describing decision alternatives related to the target situation, and performing an impact analysis on predefined evaluation criteria and indicators (e.g. financial, regulatory changes) in order to determine the consequences of these alternatives in order to select the most desirable one (Van der Raadt and Van Vliet (2008).

	Strategic Situation Analysis
Activities	• Formulate a situation assessment. The analysis of the information collected consists of answering the following three architectural questions: 1. What are the key elements of the problem or solution? 2. What are the relationships between them? 3. How do they combine to provide value higher up? • The Enterprise Architect identifies changes in the Enterprise Architecture to meet the organization's changing business requirements that must be done by clearly defining the current Enterprise Architecture, maintaining the currency of the Enterprise Architecture and identifying disruptive technology. • The Enterprise Architect supports enterprise leaders in establishing and promoting the best strategy to accomplish business goals and objectives. • It is important to identify the stakeholders to collaborate on optimizing the architecture to best serve their collective needs and keep relevant people informed of actions and decisions and progress.
Stakeholders	• Enterprise Architect • Client • Owner
Structure	• Stakeholders • Enterprise Architecture
Goal	• System concept describing the present situation • Finding new business/products opportunities

Table 5: *Summary of the Strategic Situation Analysis*

4.2.2 Goal formulation: Vision, Mission and Strategy of the Enterprise
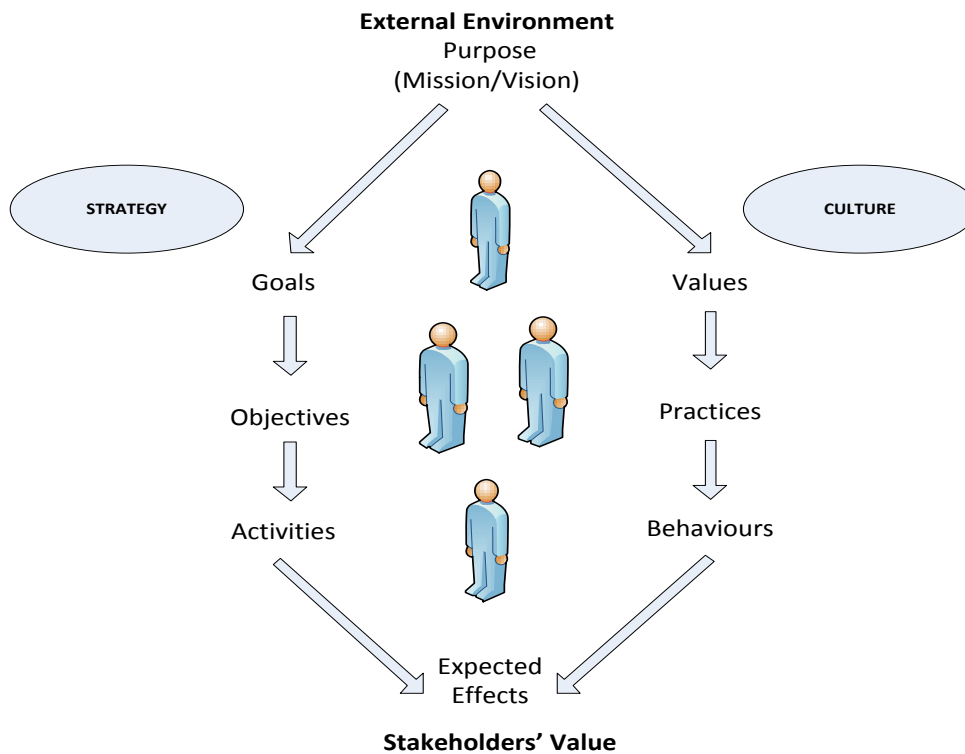
Figure 9: *Goal Formulation – An inspiration from Tosti and Jackson (2003)*

The above model presented by Tosti and Jackson (2003) is used to describe two interdependent paths for moving from a broad statement of organizational mission and vision to specific organizational results in form of expected effects. In their research on organizational alignment, Tosti and Jackson (2003) describe the two interdependent paths as follows:

I. **Strategic path:** The left-hand path which is depicted by strategy emphasizes **what** needs to be done by elucidating on the organizational strategic goals; the objectives that groups and individuals should undertake in order to carry out those strategies; the activities that must be performed to meet the goals and objectives.

II. **Cultural path:** The right-hand path emphasizes **how** things should be done by elucidating on the values that will guide people in carrying out the mission and vision; the various practices which reflect those values; the specific day-to-day behaviours which are vital in reflecting the values and practices to others as people engage in their normal work. It should be noted that the notion of values is used in this context to refer to how an organization intends to conduct its business and not peoples' personal values about their home, family, religion, or personal relationships.

According to Tosti and Jackson (2003), in order to achieve organizational alignment, it is imperative to ensure that there is compatibility between the strategic and cultural "paths", and consistence within them.

Furthermore, Tosti and Jackson (2003) argue that mission and vision depict long-term organizational intent. It should be noted that vision and mission provide guidance regarding organizational purposes which can be expressed in terms of what the organization is in business to do (mission), with a picture of the expected impact of the organization's performance (vision). A mission statement tends to be accompanied by a vision of its impact. Hence, mission statements tend to provide general guidance to everyone in the organization pertaining to how to make choices about strategies, customers and markets, products and services (Tosti and Jackson, 2003).

Tosti and Jackson (2003) expound on their model above by aligning the various components of the model as follows:

Goals and values provide greater direction pertaining to where the organization is going, and by what means. Goals and values establish how the organization intends to allocate resources to realize the mission/vision over time (goals), and how it intends to behave as it does so (values).

Objectives and Practices are the institutionalization of strategy and values which represent decisions regarding how to implement those strategies and values. This can be envisaged through the objectives people set for themselves and the results they expect from their work units. In addition, it can also be expressed through the typical ways they interact with customers and others both within and outside the organization.

Activities and behaviours are the execution of intent hence they are the ultimate determinants of organizational performance. These two aspects represent what really takes place in an organization on a day-to-day basis. That is to say, the activities people choose to invest their time in, and the way they behave as they perform those activities. Tosti and Jackson (2003) maintain that statements of mission and vision, values and strategies are meaningful provided they are translated into action.

Expected effects in this context refer to the outcomes an organization produces and they are derived from the activities and behaviours performed.

The objective of the reengineering effort is described in this stage. There should be an initial discussion with the stakeholders in order to get an understanding of the overall objective for the project. After redefining the architecture concept (vision/mission), everyone's expectations and individual goals on all levels should be realized to get a "win/win" situation (Hedberg, 1980; Checkland, 1999; Mackenzie, 1984; Magoulas and Pessi 1998; Smith, 1999).

There are many important factors as to why management and stakeholders should have a clear understanding of the common vision in connection with all types of projects. According to Mitchell & Zmud (1995), one of the most fundamental elements in a business improvement is to have a clearly defined vision/mission, and a formulated strategy that will function as a plan to achieve a successful organizational development (Al-Mashari et al., 2003).

The goals control the design of the organization and should be established through negotiations with all involved stakeholders. This is because a clearly defined goal increases motivation and the feeling of participation, hence leading to better goal fulfillment and a

better social climate in the business. To secure stakeholders involvement, the goal should not only represent the present stakeholders but also the future stakeholders (Checkland, 1999; Mackenzie, 1984; Hedberg, 1980; Smith 1999).

Our model focuses on incorporated and proactive enterprise development with the aim of ensuring that all people in the entire organization have a clear vision of how the business should work. All the stakeholders' expectations should be satisfied. Creation of a common vision is vital to reach acceptation of change according to Al-Mashari et al. (2003). Furthermore, Al-Mashari et al. (2003) emphasize that if the organization does not establish a clear vision and an understanding of the business proposal, the integration of the new proposal could swiftly become a disaster.

According to Bredemeyer (2002), it's important at this stage to ensure that the Enterprise Architect endeavour to communicate the vision and mission to various audiences and the author uses different views to show how the architecture addresses various stakeholders' concerns.

In the following table, Bredemeyer (2002) summarizes the activities that the Enterprise Architecture should fulfil at this stage when it comes to politics:

Vision, Mission and Strategy		
What an Enterprise Architect knows	What an Enterprise Architect does	What an Enterprise Architect is
- Understands processes for getting results. - Understands stakeholders' concern and values - Responds appropriately to political situations and issues	- Proactively builds a network of relationships - Provides timely information on progress issues - Effectively communicates the value of the architecture to stakeholders	- Displays drive, energy and initiative. - Is good at technical communication. - Has strong writing skills

Table 6: *What it takes to be great in the role of an Enterprise Architect as it pertains to vision, mission and strategy of the enterprise.*

With reference to figure 12 presented by Van der Raadt and Van Vliet (2008), the type of responsibility related to the vision/mission stage in the organizational development model is also to provide advice to support EA decision-making regarding the target architecture by helping in building a vision and strategy for the future, based on its relation with its external environment regarding social, environmental and market developments, technological innovations, regulatory changes, etc.

The table below summarizes the activities in the Vision, Mission, and strategy stage.

	Vision, Mission, and Strategy of the Enterprise
Activities	• The Enterprise Architect assists managers, analysts, systems architects, and engineers in understanding the details of the strategy sufficiently well to make decisions and execute the plan that leads to realization of the shared vision, where he participates in creating a shared vision, motivating members of the enterprise to aspire to achieve the vision, and providing clear direction regarding what is required to execute a strategy to accomplish goals and objectives that result in performance improvements • The Enterprise Architect also has to communicate the key details to other specific audiences. After they establish and formalize a solution, they need to communicate that solution as well as its importance and value throughout the organization. • System Envisioning
Stakeholders	• Owner • Client • Actor • Enterprise Architect
Structure	• Enterprise Architect • Stakeholders
Goals	• System Vision • System concept • Value proposition, distinctive contribution • Models and descriptions • Prototypes • System concept describing the future situation

Table 7: *Summary of the Vision, Mission and strategy of the enterprise*

The principle of non-separability in relation to root architecture

Theoretically, we believe that the domain of architectural design deals with the description of the current architecture as well as the design of alternative architectural options of the enterprise. However, the common denominator of both kinds of architecture is the root definition (a sense of purpose, mission, vision, values, strategy, and the like). Furthermore, with reference to figure 10 below, we believe that the Framework for Enterprise Morphology (FEM) model forwarded by Svärdström et al. (2006) plays a very significant role regarding

the various architectural alignments that exist in both the current and future enterprise architecture of an enterprise. Since stakeholders have a significant impact on both the current and future enterprise architecture, they definitely affect the formation of the root architecture of the enterprise. Therefore, ensuring a clear dialog among all the involved stakeholders is essential to ensure the creation of a clear vision, mission and strategy of the enterprise (root architecture). Consequently, the Enterprise Architect plays a vital role in facilitating the shaping of the root architecture of the enterprise.
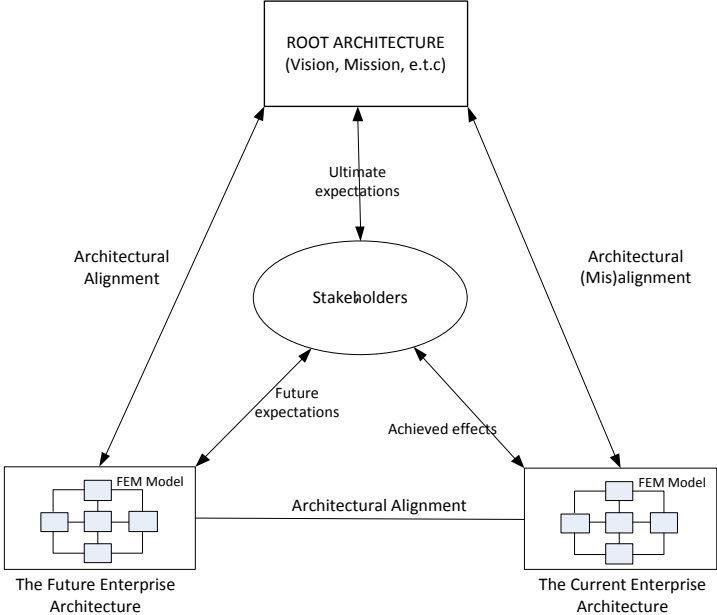
Figure 10: *The formation of Root Architecture*

 A possible explanation can be derived from the following consideration. This is because in many approaches, there is a clear distinction between strategic formulation of vision, mission, and so forth with reference to architectural design as belonging to different processes. However, in our model, both activities belong to the strategic development of the enterprise. We cannot define architecture without making any reference to root architecture.
In summary, it should be noted that our model is based on approaches where purposeful sustainability (long-term perspective) is a significant issue and therefore any current or future architecture must refer to root architecture. In summary, our model is based on non-separability between the root architecture and any form of Enterprise Architecture.

4.2.3 Architectural Design

According to the Center for Advancement of the Enterprise Architecture Profession (CAEAP), Enterprise Architects are expected to promote strategic and operational value of both the strategies and the operations of the enterprise and this can be done during the architectural design phase. Furthermore, they make architectural assessments by translating the enterprise's strategies, visions, and goals into a holistic architecture thereby integrating the viewpoints of the various domains of interest in an enterprise. Enterprise Architects also help

minimize inappropriate complexity and alleviate risk to enhance architectural value for the enterprise.

The following three figures illustrate a process which plays a significant role during architectural design. First, this process can begin with the help of establishing the goal structure by setting the main goal or objective as to why architectural design is inevitable within the enterprise. In addresses the kind of goals that are relevant in a given area of an organization. Secondly, the process proceeds with the formulation of the decision structure which depicts the various areas of responsibility as to who should be accountable regarding the pursuit of the set goals and what decisions should be made in relation to a given goal. The third phase represents the information structure which entails the information environment required to carry out architectural design.

Decision structure   Areas of responsibility structure   Information Structure
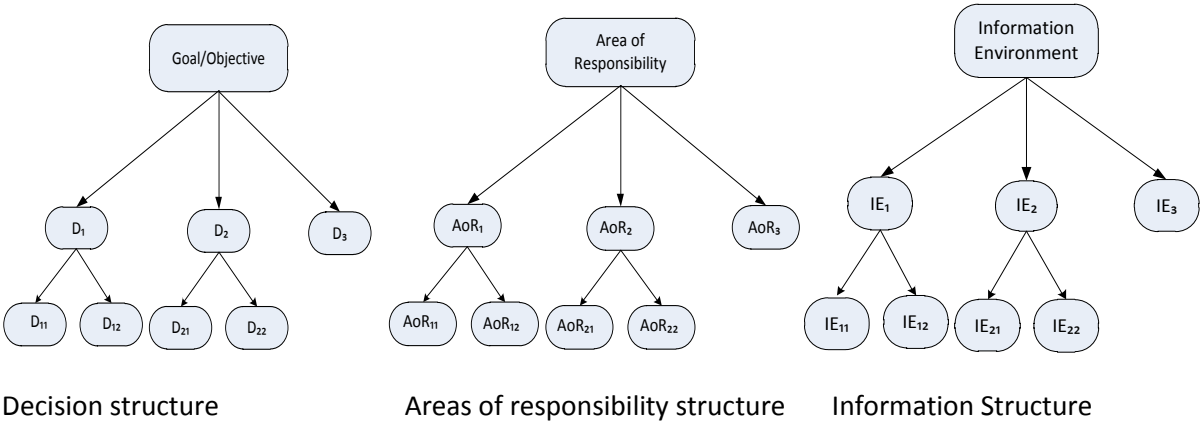
Figure 11: *Architectural Design approach based on Goals Responsibility and Information- GRI Model (Simon , 1962)*

The above picture represent three phases of H Simon's (1962) architectural development. Firstly, design begins with the stakeholders purpose. By this way, we identify the main areas of purposive activity of the enterprise. Secondly, the analysis of the proposed ideas by trying to find decisional dependencies between two or more areas of the enterprise. Lastly, the analysis of decisional dependencies identifies the informational dependencies that are necessary for absorbing the uncertainties and equivocalities of the concerned decisions. We provide a brief example of these three illustrations in the appendix.

In the Architectural Design stage, the input is an architecture concept, and is the basis for creating new or alternative architecture models. The new or alternative architecture model is an architectural design of the architecture concept, that is to say, the architecture model which is based on the stakeholders' dreams and architecture requirements for the organization (Checkland, 1985; Mackenzie, 1984; and Hedberg, 1980).

Figure 12: *Product-based design of the enterprise Adapted from Schoenherr and Aier (2008)*

We have another approach to enterprise development where the essential areas of the enterprise are not derived from its ultimate purpose but rather from its product. Therefore, the functional areas of Simon (1962) are replaced by product related areas of the above design school. Such product areas are decomposed into functional areas such as sales, manufacturing, R&D, and so forth. Accordingly, this form of design creates an essential frame for identifying areas of reusability as the above design demonstrates. For instance, the case of product *n* and product I expresses the condition for reusability with respect to the sales function.

Furthermore, the areas of the enterprise can be integrated by information exchange in order to prohibit undesired dependencies that are derived from the primary product-based decomposition and secondary further functional decomposition. However, reusability promotes cost savings but create undesired dependencies because the real meaning of reusability is that two functional areas that belong to different products use the same operational logic and therefore they prohibit the possibility of having an independent choice.

The same architectural concept can lead to one or several new or alternative architecture models (Checkland, 1985). The people who are independent from the organization should be the ones to perform the design process. This is because members within the organization can really have a hard time being objective since they have their own interests in the process (Mackenzie, 1984).

Since design issues change over time, a problem can adopt a new shape and be out of date if the design takes such a long time. It is crucial therefore to strive for swiftness in the architectural design process (Mackenzie, 1984).

According to Mackenzie (1984), clarity about the new design makes it easier to implement it and it becomes more stable. Mackenzie (1984) further argues that a specific design about details and assumptions is to be preferred which implies that a clear specification increases

the understanding among the various members within in the organization and it leads to mutual acceptance of the new design. Accordingly, the output from the architectural design stage is a new or alternative architecture model(s) (Checkland, 1985; Mackenzie, 1984; and Hedberg, 1980).

This stage is what Walker (2007) refers to as the design phase. Walker (2007) points out that Enterprise Architects will typically rely on domain architects and developers in order to get down to the micro level of detail. Enterprise Architects need to review the architecture as a whole once it is complete and to be able to see how all the pieces fit in the enterprise (Walker, 2007).

Enterprise Architects use guidelines and models on applying the architecture. Furthermore, mandates, policies and standards can also be used by Enterprise Architects for addressing architecture recommendations and objectives. They also guide engineers in creating designs that maintain the integrity of the architecture and guide procurers in purchasing technologies and solutions (Strano and Rehmani, 2007).

According to Bredemeyer (2002), the objective of the Enterprise Architect in this phase is to create an architecture that is good and well documented. Moreover, the architecture should be technically sound in that it should meet the various needs of stakeholders, business, developers, customers and managers in a successful way (as it is actually used in building systems).

Bredemeyer (2002) summarizes the activities that the Enterprise Architecture should fulfil at this stage when it comes to politics as follows:

Architectural Design		
What the Enterprise Architect knows	What the Enterprise Architect does	What the Enterprise Architect is
• Understands that politics, not technology, establishes the limits on what can be achieved. • Knows that the best engineering solutions are not necessarily the best political solutions. • Knows who to influence and when	• Listens and networks; builds relationships across groups. • Works well across groups, achieving support for broader goals. • Influences without authority. • Actively and effectively "sells" the architecture to multiple groups	• Insightful into people dynamics. • Intuitively grasps practical implications. • Has strong interpersonal skills and is able to gain support and get things done. • Is comfortable and skilful working with diverse stakeholder groups

Table 8: *What it takes to be great in the role of Enterprise Architect during the architectural design phase*

While elucidating on the Enterprise Architecture delivery function, Van der Raadt and Van Vliet (2008) emphasize the importance of the following responsibility of the Enterprise Architect at the architectural design stage: In essence, the Enterprise Architect is to

Create and maintain Enterprise Architecture products that describe the:

- Current state architecture that, together with its bottlenecks and accompanying risks, will provide insight in the as-is situation of the operational environment.

- Concrete target state architecture describing the chosen decision alternative in detail based on the vision and strategy. The current target architecture is assessed on its ability to cope with possible external and internal changes using various future scenarios.

- Roadmap from the current state to the target situation, where impact of the elements in the architecture and the mutual relation between them is described, and the sequence of implementation steps is given.

- EA policies based on development within the organization and on up-to-date knowledge of industry standards, and determine their potential impact.

The Enterprise Architect interfaces with other Enterprise Architects at different levels of the enterprise in order to oversee the quality of the Enterprise Architect and ensure concordance of the architectures. Enterprise Architects are accountable to several oversight groups, and this requires continual coordination and collaboration with members and staff of these oversight groups and committees to ensure compliance with policies, laws and directives (Strano and Rehmani, 2007).

The table below summarizes the activities in the architectural design stage.

	Architectural Design
Activities	- Create and maintain Enterprise Architecture products that describe the current state architecture, the concrete target state architecture, based on the vision and strategy, the roadmap from the current state to the target situation, and Enterprise Architecture policies based on up-to-date knowledge of industry standards and development within the organization, and determine their potential impact. - Capture architectural requirements, create architectural models and evaluate alternatives and validate architecture against requirements for the creation of an architecture that will be good, technically sound and well documented; right in the sense that it meets its stakeholders needs, business, customers, developers, managers; and successful (actually used in building systems). - Influence IT projects and systems, which depends on the extent to which architects enable the target audience to easily use the architecture and actively assist projects in using it. The Enterprise Architect interfaces with other Enterprise Architects at different levels of the enterprise in order to ensure concordance of the architectures and oversees the quality of the EA. - Assist the functional groups in understanding the complexities of the architecture

	so that the architecture will be properly implemented to achieve the desired performance and help ensure that each group is collaborating with the appropriate other groups. This means to ensure continual coordination and collaboration with staff and members of these oversight groups and committees to ensure compliance with laws, policies and directives.
Stakeholders	• Enterprise Architect (designer) and architects at different levels
Structure	• Enterprise Architect as a designer
Goal	• Create a new or alternative architecture model(s) • Architectural requirements • Architecture models • Components specifications • Architecture guidelines and standards

Table 9: *A summary of the Architectural design Stage*

4.2.4 Change Management. Pre-Evaluation

During this stage, changes are defined together with all the stakeholders involved through a comparative analysis between current and future architecture models. Checkland (1985) maintains that the purpose of the change management stage is to create a debate among all stakeholders about conceivable changes that meet two criteria: that is to say, culturally and systemically feasible in a particular situation in question. He further argues that if the models do not meet all the stakeholders' requirements, one have to go back to the architectural design stage or situation analysis stage (Checkland, 1985).

In addition, Hedberg (1980) puts emphasis on the importance of taking all perspectives and knowledge (people, technology, power, organizations, rewards, and values) into consideration for sound decision making. Many political factors need to be taken into consideration, for example labour union and owner relations, among others. If these factors are not noticed during evaluation, it could inhibit the next stage which is implementation. (Mackenzie, 1984)

In the change management stage, appropriate changes are identified as the definition of feasible and desirable changes are addressed within a given new problem situation and it is

important to decide how these changes will be implemented. The output from the change management stage is the action plan (Checkland, 1985).

This stage is what Walker (2007) refers to as the stabilize phase. During testing cycles, it is inevitable that the application will need to be changed in some way or another. It may warrant an Enterprise Architect to review the changes and aid the project team to steer them in the right direction if there are any significant changes to the architecture (Walker, 2007).

As described earlier on, Bredemeyer (2002) puts emphasis on what the Enterprise Architecture knows, does and is when it comes to politics at this stage. This can be illustrated in the following table below:

Change Management		
What an Enterprise Architect knows	What an Enterprise Architect does	What an Enterprise Architect is
- Knows who the key players are and what they care about. - Recognizes where power is focused and how it flows in the organization. - Understands the political process and the networks of influence across the business. - Understands the organization's culture and core values.	- Builds internal or external coalitions to work on shared outcomes. - Influences business leaders at the highest level in the organization. - Takes and retakes the "pulse" of the critical stakeholders who can impact the success of the architecture.	- Perceptive and shrewd with a good sense of what can practically be achieved. - Sees a bigger outcome for the organization and is passionate about it. - A role model upholding high standards of personal and technical integrity.

Table 10: *What it takes to be great in the role of an Enterprise Architect during the change management phase.*

With reference to the situation analysis phase, it should be noted that Van der Raadt and Van Vliet (2008) consider the following responsibility of the Enterprise Architect in the Enterprise Architecture delivery function at the change management stage as vital. In essence, the Enterprise Architect should:

Validate EA conformance by:

- Reviewing programs or projects on their compliance with the applicable:

    - Target architectures at enterprise and domain levels to ensure that individual programs and project results contribute to achieving general business goals and the target situation described in those target architectures.

- Current state architectures ensuring the project results and operational readiness of the program before deployment, thus safeguarding.

- EA policies to ensure that change activities of projects or programs contribute to achieve the integration goals and standardization set with EA.

- Handling waiver requests by assessing the implications of allowing programs and projects that file the requests to deviate from a specific guideline.

Enterprise Architects interface with senior executives to seek and give advice in this stage (Strano and Rehmani, 2007). They interface with chief executive officers to ensure that they understand the vision of the enterprise leaders. They also help to ensure that senior executives are cognizant of the level of commitment in terms of resources needed to execute the different architectural options so that practical choices are made and can be realized. This is one of the most important interfaces with the Enterprise Architect because unless the senior leaders are fully committed to the enterprise-wide strategic plan, there is little possibility that it will succeed (Strano and Rehmani, 2007).

The table below summarizes the activities in the change management stage.

	Change Management
Activities	- Appropriate changes are also identified as the definition of desirable and feasible changes given a new problem situation. It is important to decide how these changes will be implemented at this stage. - Update architecture documentation, requirements, assess architecture against requirements (impact analysis) and restructure architecture - Validate Enterprise Architecture conformance by reviewing programs or projects on their compliance with the applicable target architectures, Enterprise Architecture policies, and the current state architectures, and by handling waiver requests, assessing the implications of allowing programs and projects that file the requests to deviate from a specific guideline. - Organize the architecture team and ensures that adequate resources are secured to perform the architecture process. - Ensure that senior executives are cognizant of the level of commitment in terms of resources needed to execute the different architectural options so that practical choices are made and can be realized. Furthermore, Enterprise Architects should ensure that they fully understand the vision of the enterprise leaders.
Stakeholders	- Enterprise Architect - Owner - Client

Structure	• Architects within respective domain
Goal	• Evolve an existing architecture • Planned actions (action plan) • Decided or proposed changes • Updated Architecture • Updated requirements. • Impact analysis results. • Revised architecture models

Table 11*: Summary of the Change Management stage*

4.2.5 Architectural Implementation

In the architectural implementation stage, a plan of action (implementation) is defined in terms of projects, that is to say, a project portfolio. When some changes which are accepted as "feasible" and "desirable" have been identified together with those stakeholders involved in the change management stage, implementing these changes almost completes the cycle of the organizational development model (Checkland, 1985).

It is more usual to think of the organizational development process as cyclic in nature. While some change projects may be one-off interventions, an intermediate or short cycle is appropriate in many projects where transition processes are re-examined in light of early implementation and adjusted as necessary (i.e. returning to stages 2 and 3). This involves investigation and monitoring in order to keep track of the effects of the project. In essence, it is a basic form of action research. Once the effects of implementation become apparent, it is then possible to return to stage 1 and map (and reflect critically on) how the rich picture has changed and see if the overall nature of the situation has changed in any way. However, in large-scale or open systems, it could happen that as one change takes effect another problematic situation often surfaces, thereby pointing to an on-going set of processes rather than distinct interventions. It should be noted that the output from the implementation stage is experienced strengths and weaknesses with the new solution (Checkland, 1985).

According to Van der Raadt and Van Vliet (2008), it is the responsibility of the Enterprise Architect in the Enterprise Architecture delivery function at the architectural implementation stage to provide support in applying Enterprise Architect products towards programs and projects (e.g. through training and coaching) by:

- Creating program and project target architectures based on the Enterprise Architecture products at domain and enterprise levels.

- Conforming to the Enterprise Architecture products in running programs and projects.

Consequently, Enterprise Architects should interface at the architectural implementation stage with human resource specialists in order to better understand constraints or requirements that must be factored into the Enterprise Architecture. In addition, they should assist the functional groups in understanding the complexities of the architecture to ensure that the architecture is properly implemented in order to achieve the desired performance outcomes and help ensure that each group is collaborating with the appropriate groups within the enterprise. These interfaces are very important for making sure that everyone understands and is aligned with the strategic goals that will result in the realization of the shared vision (Strano and Rehmani, 2007).

Architectural Implementation		
What an Enterprise Architect knows	What an Enterprise Architect does	What an Enterprise Architect is
• Implementation Techniques	1. Communicate, communicate, and communicate! 2. Listen, network, influence 3. Keep the vision alive	• Able to see from and sell to multiple viewpoints • Confident and articulate • Ambitious and driven • Patient and not Resilient

Table 12: *What it takes to be great in the role of enterprise architect during the architectural implementation phase*

Implementability is a common requisite in all the underlying theoretical models that support the PED model. In this concept, we can identify some principles that dominate the ideas of architectural thinking. These principles are:

1. The principle of non-separability

2. The principle of comprehensibility

3. The principle of learning

1. The principle of non-separability

According to the principle of non-separability, architectural design and the implementation of such design are two sides of the same coin. This aspect, for instance, is not so clear in

TOGAF where it is maintained that the Enterprise Architect has nothing to do with implementation (Ref. TOGAF).

To have an agile architecture does not mean that we should have independent parts. For instance, according to Simon's (1962) design, we have nearly decomposed parts (agile) but not independent parts.

2. The principle of comprehensibility

This is a Swedish principle of the relationship between design and implementation following the logic of Langefors (1975) about comprehensibility especially in large organizations. It means that the whole enterprise determines changes according to the Enterprise Architecture. However, the implementation of changes is carried out on a local basis. Thus, according to Langefors (1978), we have global thinking (architectural design) and local action. Thus, the architectural designer's world becomes a means for coordination whereby the Enterprise Architect has the role and responsibility of a coordinator.

Some aspect of such coordination principle is the principle of delineation of information systems as well as the principle of interoperability between information systems and between various domains of the enterprise. According to the first principle, every information system belongs to just one area of responsibility (Langefors, 1974; Hugoson, 1990; and Simon, 1962).

Hugoson et al. (2008) maintain that one of the major challenges in designing and developing Enterprise Architecture is to determine the degree of interoperability that might be required between the various business units of the enterprise and how this should be reflected in the integration of their information systems. Interoperability can be defined as the ability of two or more systems or components to exchange and use information (IEEE, 1990).

According to the principle of interoperability, the proper pattern to organize the information flow between units is that which does not create unnecessary interdependencies. The concept of agility is the best expression of such form of interoperability. That means that every organizational unit can become innovative, adaptive, robust, flexible, responsive, as well as having the ability to recover quickly from undesired events. This last aspect is protected by another critical principle which deals with business continuity (the enterprise is in operation 24/7 a week and 365 days a year with or without the support of technology).

3. The principle of learning

The last principle deals with the dilemma between learning through experience and quick implementation. If we adopt the first principle, in essence, we adopt a sequential strategy for implementation. This sequential strategy means that we first implement in one area of business, then in the next one and by this way we successively minimize implementation errors. An alternative to the sequential strategy is the so-called concurrent strategy which means that many implementation projects operate simultaneously. By this way, we minimize the time for the implementation process but lose the quality of implementation.

The real meaning of proactive enterprise development is the dependency between Enterprise Architectural design and the implementation of changes in such design proactively. It means that first we change the design, and then we change the architected reality. However, any form of changes in architectural design presupposes the awareness or acceptance of such

changes by the stockholders. It should be noted that the expected effects implied by the architectural design of the enterprise becomes a reality and is experienced after implementation. However, the Enterprise Architect facilitates the coordination of those changes. A practical example to illustrate this scenario is when we consider a large organization with numerous branches or chains in different locations where both consequential and concurrent strategies can be applicable.

The following table below summarizes the activities in the architectural implementation stage:

	Architectural implementation
Activities	- Define a plan of action. - Provide a representation of the relationships of enterprise components with sufficient detail and in the format needed to enable making necessary decisions necessary in executing the strategic plan. - Planning migration, translation and implementation strategies. - Stakeholder communication strategies- internal and external marketing.
Stakeholders	Awareness
Structure	- Stakeholders - Enterprise Architecture
Goal	Implementation of changes

Table 13: *Summary of the Architectural implementation*

4.2.6 Strategic Situation Analysis (Post-Evaluation)

In summary, after the implementation phase, the next stage is to return back to the strategic situation analysis in order to evaluate and create understanding about the effects of changes as well as the recommendation for the new cycle of development. This is what Walker (2007) refers to as the production phase. During this phase, an Enterprise Architect can begin to work with post-production resources responsible for the maintenance of the application. Enterprise Architects can help in building out how the technology will be incorporated in the IT portfolio

with a subsequent life cycle and how it will be versioned. Furthermore, they can build out of leftover architecture decisions, if there are any service endpoints or management of endpoint (Walker, 2007).

	Situation Analysis (post-evaluation)
Activities	Evaluation of realized expectations • Satisfied owner. • Satisfied client. • Satisfied actor.
Stakeholders	• Owner • Client • Actor
Structure	• Stakeholders • Enterprise Architecture
Goal	• What was achieved • Experienced strengths and weaknesses with the new solution. • Experience of the architecture concept

Table 14: *Summary of the Strategic Situation Analysis (Post- Evaluation)*

4.3 Design of enquiries

With reference to our model (PED) which highlights the Enterprise Architect's role in organizational development, we have been able to design the interview questions which have been very instrumental in providing the basis for our empirical study. Consequently, the interview questions have been divided according to the different domains of the PED model. Moreover, the questions are derived from the four fundamental theories (the socio-cultural approach by Checkland (1995), the rational approach by Mackenzie (1984), the socio-political approach by Hedberg (1980), and the alignment or integrated approach by Tichy (1983) which have formed the grounds for this Master Thesis. It should be noted that the detailed explanation of the design of our enquiries is in the appendix.

5. Empirical analysis of our study

In this chapter, we present the empirical analysis of our study in relation to the PED model.

The following respondents have contributed to our empirical study by participating in answering the interview questions:

Respondent A: Per Björkegren, currently the CTO at Sogeti Sverige AB; Sogeti's notable guru within Enterprise Architecture and SOA.

Respondent B: Lennart Idrestedt, Consultant and Enterprise Architect at Tieto.

Respondent C: Jan Magnusson, Business Analyst and Enterprise Architect at EVRY.

Respondent D: Mats-Åke Hugoson, Professor in Informatics, Jönköping International Business School, Sweden; Visiting professor, Department of Applied IT, University of Gothenburg, Sweden.

Furthermore, we have chosen to present the empirical analysis of our study in a table format as it pertains to the interview results from the four respondents during our empirical study. The respondents were required to answer the interview questions by choosing from a scale of 1-5. Depending on the type of question and the corresponding answers, the scale of 1-5 could be used to refer to the following possibilities:

Where 1 is equivalent to the *lowest degree* and 5 is equivalent to the *highest degree*;

Where 1 is equivalent to *very poor* and 5 is equivalent to *very well*;

Where 1 is equivalent to *excellent* and 5 is equivalent to *very unsatisfactory*;

Where 1 is equivalent to *not being essential* and 5 is equivalent to *highly essential*;

In other words, by choosing 5 as one of the options in answering a specific question, it implies that the respondent fully agrees with a given answer. Option 4 also signifies that the respondent agrees with the provided answer to a greater extent. Option 3 provides a moderate response while option 2 signifies a relatively low varying degree of response to a given question. However, by choosing 1 as the option implies that either the respondent does not agree with the provided answer or there is a possibility that the respondent does not fully understand how to answer a given question. There is also a tendency for the respondent to interpret the questions in different ways besides the provided answers.

5.1 Strategic Situation Analysis

5.1.1. Understanding the constitutional parts of the enterprise development process:

To what extent does an Enterprise Architect understand the following steps as constitutional parts of the enterprise development process?

	Respondents			
Possible Answers	A	B	C	D
• Making a strategic analysis of the current and future environment of the enterprise. In the same sense, the degree of alignment between the expected effects and the real effects are evaluated	5	4	4	1
• Formulating the mission, vision, values and strategy of the enterprise	-	5	4	1
• Designing alternative architectures of the enterprise	5	5	4	1
• Compare current and alternative architectures in order to obtain a strong shared understanding of the necessary architectural changes that should be implemented as well as the expected effects resulting from these implementations. Lastly, determine and propose changes that are based on negotiations.	5	5	5	4
• Implementing the changes that have been decided upon	5	4	4	1
• Analyzing the effects that are generated by the implemented changes and deciding about the degree of alignment between the expected effects and the real effects provided by the implemented actions.	3	5	4	1
• Other				

Our observations reveal that three of the respondents from the IT consultancy firms gave very high points in relation to understanding the constitutional parts of the enterprise development process by the Enterprise Architect. Hence, the majority of respondents share the same opinion about the constitutional part of the enterprise development process. However, one of the respondents gave the lowest points on all the constitutional parts with the exception of the issue which relates to comparing the current and alternative architectures yet it is the most essential constitutional part of the enterprise development process. This reveals a strong similarity that exists between the empirical findings and our model in this regard.

Lastly any change determined by the constitutional comparison becomes the ground of negotiation rather than top management command. Another point that we can derive from the above answers is that the formulation of mission, vision, values and strategy of the enterprise does not belong to the domain of architect or Enterprise Architect and this does not agree with the definition of the enterprise development concerned by the model.

5.1.2. Methods for determining and supporting the content of the strategic situation analysis

To what extent does the Enterprise Architect understand the kind of methods or techniques that can be used to facilitate the strategic situation analysis process?

Possible Answers

Adequacy of methods with respect to the delineation and focus of situation analysis	Internal relationships between the constitutional parts of the enterprise e.g. Inter-departmental relationships		External relationships between the enterprise and its customers and suppliers e.g. CRM, Supply Relations Management, Inter-organizational relationships , transactional relationships, etc.		Macro relationships between enterprise and its macro-environment environmental (participating in alliances with the emphasis on creating future relationships)	
	Respondents		Respondents		Respondents	
	A	B	A	B	A	B
CATWOE		3	4	1	4	1
CSF	3	4	3	1	3	1
SWOT	5	4	5	3	5	3
PEST (STEP/ PESTLE)			3		4	
USE-Case diagrams	5	3	5	1	3	1
Enterprise-wide prototypes	5	5	5	1	3	1
Other methods...						

5.1.3. Maintaining a continuous dialogue with the stakeholders in order to obtain the required agreement about the approach to be followed

To what extent does the Enterprise Architect understand the kind of models that are relevant in facilitating the communication and dialogues between the stakeholders during the development process?

According to our respondents, in the situation analysis, the dominant way of communication

Possible Answers	Respondents			
	A	B	C	D
• Formal mathematical models, i.e. systems of equations	3	4	3	-
• Statistical diagrams	3	4	4	1
• Object models based on UML diagrams	3	5	2	2
• Rich pictures based on CATWOE techniques	5	4	4	1
• Metaphors given in natural language or visual language	5	5	5	3
• SWOT model	5	4	5	3
• PEST model	5	3	3	3
• Seminars/workshops	5	5	5	5
• Formal meetings	4	5	3	4
• Informal meetings	5	5	3	4
• Telephone contact	3	5	2	4
• Email	3	5	3	2
• Other alternatives	-	-	-	2

and dialogues between the stakeholders during the development process are the seminars/workshops. There are no clear trends in the types of methods, techniques and models used to facilitate this communication. However, SWOT and CATWOE models, and informal meetings were also rated highly by the respondents.

To this end, they are close to our model since they give relatively high points.

5.1.4. Essential results that must be provided from the strategic situation analysis

> *To what extent does the Enterprise Architect understand the kind of results that must be provided in order to facilitate the next steps within the enterprise development process?*

	Respondents			
Possible Answers	A	B	C	D
• Models that represent the current situation of the enterprise i.e. internal relationships, external relationships, macro-environmental relationships.	4	4	4	5
• The real experience effects of development provided by the enterprise in terms of both performance as well as stakeholders satisfaction	4	5	4	4
• Structural, functional, infological, socio-cultural, etc. cases of misalignment	4	3	3	4
• The meaning of these conflicts for the existence of the enterprise as well as the frequencies of these conflicts	4	4	3	4
• Other kind of results	-	-	-	-

For the majority of respondents, the results that must be provided in order to facilitate the next steps of a proactive enterprise development process are in particular, models that represent the current situation and the real experience effects of development provided by the enterprise in terms of both performance as well as stakeholders' satisfaction. This is not enough. Our model also emphasizes the importance of identifying the meaning of these conflicts for the existence of the enterprise as well as the frequencies of these conflicts.

5.1.5. Understanding the role and importance of stakeholders in the situation analysis process

To what extent does the Enterprise Architect understand the roles played by each of the following categories of stakeholders in relation to the situation analysis process?

	Respondents			
Possible Answers	A	B	C	D
• Operations management team	4	4	4	5
• Operations managers	4	4	3	5
• Operations personnel/staff	3	4	3	4
• Customers	3	5	4	5
• Owners	2	5	3	4
• Competitors	2	5	3	5
• CEO (Chief Executive Officer)	5	4	4	5
• CIO (Chief Information Officer)	5	4	5	5
• CTO (Chief Technical Officer)	-	4	5	4
• Current and future partners of the enterprise	4	5	3	5
• Other groups				

According to our respondents, the stakeholder group with the greatest involvement during this phase is that of the operations management team; i.e. the CEO, CIO and CTO. This means that the leadership of the organisation are the most relevant according to our respondents.

These answers are consistent with our theory but it is not complete since in our model, it is expected that several types of stakeholders should participate in the situation analysis phase. Half of the respondents believe that operations personnel/staff, owners and competitors are not so relevant.

5.1.6. Understanding the role of the Enterprise Architect in the situation analysis process

To what extent does the Enterprise Architect play the following roles in the situation analysis process?

	Respondents			
Possible Answers	A	B	C	D
• A Teacher	4	5	3	5
• A Listener	5	5	4	5
• A Policymaker	4	4	3	3
• A Mediator/conflict solver	4	5	1	4
• A "Politicians"/negotiator	5	5	2	3
• As a change agent	5	5	2	5
• Enterprise Architect	5	4	5	2
• Business architect	5	4	4	1
• IS architect	4	4	3	5
• Other possible roles				

There are no clear trends in the roles that the Enterprise Architect should play during this stage according to the results that we can see from the table above. However, all respondents agree that the role of a listener is the most important one and is the one given the highest score.

Most of the respondents have pointed the importance of roles as negotiator, change agent and as a teacher. Hence, there is a strong empirical support for our model with regard to this question.

5.1.7. Representing the holistic perspective in the situation analysis process

To what extent does the Enterprise Architect understand the following perspective of analysis in the situation analysis process?

Possible Answers	Respondents			
	A	B	C	D
• Rational	4	4	5	3
• Socio-Cultural	5	4	3	3
• Economic	5	4	3	3
• Structural	5	4	5	3
• Strategic	5	4	4	5
• Contextual	4	4	4	4
• Holistic	5	4	4	4
• Infological (cognitive)	3	4	4	5
• Other possible alternatives				

The table above shows that respondents believe in the importance of using a holistic perspective of analysis by the Enterprise Architect during the situation analysis process. Many of the perspectives of analysis during this stage are relevant, i.e. the holistic, strategic and contextual have received relatively high points from our respondents.

However, some of the respondents did not give very high points to the socio-cultural and economic perspective, which according to our model is very important and relevant. We have to point out that our respondents see most of the perspectives as relevant which gives a strong support for our model in this regard.

5.2 Vision, Mission, and Strategy

5.2.1. Understanding why the establishment of root definition/root architecture makes sense

To what extent does the Enterprise Architect understand why the establishment of root architecture makes sense?

Possible Answers	Respondents			
	A	B	C	D
• The root architecture is the proper foundation upon which a sound Enterprise Architecture is designed and implemented	5	5	4	3
• The root architecture is the ground for a sustainable (long-term perspective) Enterprise Architecture	5	5	5	3
• The root architecture provides a way for avoiding the penalties of architectures derived from requirements that are sensitive to time	5	5	3	3
• The root architecture always provides a sound direction for a meaningful enterprise development. Any fundamental change of the root architecture leads to some form of re-orientation	5	4	3	3
• Other alternatives	-	-	-	-

From our empirical findings, we have observed that while two of our respondents gave the highest points, the other two made a moderate rating regarding the importance of the Enterprise Architect endeavour to understand as to why the establishment of root architecture with in an enterprise makes sense. This is very consistent with our model because the root architecture is the ground for sustainable Enterprise Architecture and provides a sound direction for a meaningful proactive enterprise development.

Another point that we can deduce from the information above is that respondents see the root architecture as the ground for long-term perspective in enterprise development.

5.2.2. Understanding the content and form of a root architecture

To what extent does the Enterprise Architect understand the constitutional parts of an enterprise "root architecture?"

Possible Answers	Respondents			
	A	B	C	D
• Mission of the enterprise i.e. social responsibility	4	4	3	3
• Ultimate purpose of the enterprise i.e. reason d'être	4	4	4	3
• Vision of the enterprise	5	5	4	3
• Expectations of the stakeholders such as owners	4	5	3	3
• Core values of the enterprise, i.e. culture, world views, etc.	5	5	2	3
• Legal and social constraints (the requisite of sustainability)	4	5	3	3
• Goals and objectives of the enterprise	5	5	4	3
• Core activities	5	5	4	3
• Expected behavior of the enterprise	4	5	2	3
• Other alternatives answer	-	-	-	-

We have observed that two of our respondents offered a very positive response by giving the highest points regarding the enterprise's mission, vision, ultimate purpose, core values, core activities goals and objectives, stakeholders' expectations, etcetera.

However, some of the alternatives haven't been highly rated from some of the respondents, as in the case of the expected behaviour of the enterprise, core values of the enterprise. Furthermore, the mission of the enterprise and expectations of the stakeholders also received moderate points and is not consistent with our model. Note that one of the respondents rated by giving only 3 points to all the alternative answers. In essence, the other two respondents gave a moderate rating regarding the constitutional parts that are embedded within the root architecture of an enterprise.

The general response here from our empirical findings reveals support for our model.

5.2.3. Understanding the correct way for establishing a root architecture

> ***To what extent does the Enterprise Architect understand how the root architecture is or how it should be established?***

	Respondents			
Possible Answers	A	B	C	D
• By a distinct arrangement of priorities between the expectations of the stakeholders	5	5	3	3
• By the power of a dominated coalition over any other stakeholder	3	4	2	3
• By the professional authority of an Enterprise Architect	3	5	5	3
• By negotiation between the participating stakeholders	4	4	3	3
• By the leadership of the enterprise	4	4	2	3
• By active participation in any decision that belongs to the domain of change management	5	4	5	3
• By consensus of participating stakeholders	5	4	3	3
• By a meaningful accepted by stakeholders' utopia	2	4	3	3
• Other alternatives	-	-	-	-

Based on our general observation, two of the respondents gave high points regarding the extent to which an Enterprise Architect ought to understand the current state of the root architecture or how it should be established. This is a substantial similarity in relation to our model on the subject matter. Some respondents believe that a root architecture should established by the professional authority of an Enterprise Architect and it's consistent with our model, since our model advocates for an increasing importance in the role of an Enterprise Architect.

While on the other hand, it is important that all stakeholders' requirements are mapped into the mission stage and yet according to our observation, this doesn't agree with the answers from a big percentage of our respondents. Furthermore, the response given by one of the respondents was moderate in all the possible answers. Moreover, the attempt by the Enterprise Architect to understand the establishment of root architecture by the power of a dominated coalition over any other stakeholder; by the leadership of the enterprise; and by a meaningful way accepted by stakeholders' utopic views, received very low ratings from some of the respondents hence indicating a considerable deviation from our model.

5.2.4. Understanding the criteria underlying the acceptance of a root architecture

> *To what extent does the Enterprise Architect understand the kind of criteria that must be satisfied by the root architecture in order to be accepted?*

Possible Answers	Respondents			
	A	B	C	D
• Rational enterprise performance	3	5	4	3
• Rational performance and cultural feasibility	4	4	4	3
• Social symmetry and equity (win/win)	4	4	2	3
• By negotiation between the participating stakeholders	4	4	3	3
• By the leadership of the enterprise	4	4	4	3
• By a sense of consensus between the participating stakeholders	5	4	3	3
• By voting between the stakeholders	3	3	2	3
• Other alternatives				

Two respondents gave relatively high ratings regarding the extent to which the Enterprise Architect should understand the criteria that the root architecture must fulfil in order for it to gain acceptance. This illustrates a strong similarity between the empirical findings and our model. It should be noted that both criteria related to rational performance and cultural feasibility and the one related to satisfying the leadership of the enterprise received relatively very high ratings by three of the respondents. Although one of the respondents offered a moderate response to all the possible answers on the subject matter, another respondent happened to deviate from our model by giving very low ratings where social symmetry and equity criterion and voting between the stakeholders criterion are concerned.

However, only two of the respondents believe that a sense of consensus between the participating stakeholders is relevant which doesn't agree with what our model advocates.

5.3 Architectural design

(Re)-Designing the Architecture of the Enterprise

5.3.1. Essential parts of Enterprise Architecture

To what extent does the Enterprise Architect understand the essential parts of the architecture of the enterprise?

	Respondents			
Possible Answers	A	B	C	D
• Business processes	5	5	5	5
• Stakeholders	5	4	3	4
• Employees	3	5	2	4
• Managers	5	5	2	5
• Enterprise purpose	5	5	4	4
• Structure of authority and responsibilities	5	5	4	5
• Vision, mission, strategy	5	5	5	4
• Internal and external context	4	5	4	5
• Information systems	4	5	5	5
• Information infrastructure	4	5	5	5
• Actual requirements for change	5	4	5	5
• Other essential parts				

The majority of the respondents share the same opinion about the essential parts of the architecture of the enterprise. In essence, we have observed from our empirical findings that all the respondents have generally given very high ratings regarding the need for the Enterprise Architect to grasp all the essential parts of the architecture of the enterprise. This presents a strong similarity between the empirical findings and our model on the subject matter.

However, the most important part is the business process, according the respondents, as well as the information infrastructure, actual requirements of change and the vision, mission strategy of the enterprise. Another point that we derive from the above answers is that employees are not seen as an important and essential part of the architecture of the enterprise, which doesn't agree with our model

In essence, low ratings were given to the employees, stakeholders and managers by some of the respondents hence revealing a deviation from our model. Our model maintains that architecture is not about technology alone, hence we believe that the human component is very important and essential as well.

5.3.2. Essential relationships that belong to the Enterprise Architecture

To what extent does the Enterprise Architect understand the relationships that exist between the information system of the enterprise and the essential parts of the architecture of the enterprise?

Possible Answers	Respondents			
	A	B	C	D
• Functional relationships	4	5	5	5
• Business process-oriented relationships	5	5	5	5
• Service-oriented relationships	5	5	5	5
• Structural relationships	4	5	5	5
• Infological relationships	5	4	5	5
• Cognitive relationships	4	4	3	5
• Decisional relationships	5	5	3	5
• Contextual relationships	5	5	4	5
• Socio-cultural relationships	5	4	3	5
• Purposeful relationships	4	5	3	5
• Others				

Most of the answers have been highly rated by our respondents; which means that they are aware of the importance of the different relationships that exist between the information system of the enterprise and the essential part of the architecture. This portrays a very strong similarity that exists between our model and the empirical results this is consistent with what our model advocates.

However, only one correspondent gave moderate ratings on cognitive relationships, decisional relationships, socio-cultural relationships, and purposeful relationships.

5.3.3. Forms of interoperability involved in the Enterprise Architecture

> *To what extent does the Enterprise Architect understand the forms of interoperability that belong to the architecture of the enterprise?*

Possible Answers	Respondents			
	A	B	C	D
• Unification	5	4	4	5
• Collaboration	5	5	4	5
• Replication	4	4	4	5
• Standardization	5	5	4	5
• Coordination	3	5	4	5
• Cooperation	4	5	4	5
• Information-based integration	5	5	5	5
• Inter-sharing	5	4	4	5
• Inter-linking	4	4	4	5
• Information-based differentiation.	5	5	4	5
• Other				

As we saw in the previous question, in this case, most of respondents agree in that all forms of interoperability that belong to the architecture of the enterprise are important and relevant. We can derive from the table above that information-based integrations is highest rated by all respondents. Respondents share the same opinion about all forms of interoperability.

Only one respondent considered coordination to be a moderate form of interoperability that the Enterprise Architect ought to understand. Apart from this deviation from our model, the rest of the respondents offered relatively high ratings as mentioned earlier, hence portraying a strong similarity between the empirical outcomes with our model. Furthermore, a closer look at the empirical results indicates that information-based integration has received the highest rating followed by collaboration, standardization, and information-based differentiation.

5.3.4. Understanding the role and importance of stakeholders during the architectural design stage

To what extent are the following stakeholder groups actively involved in architectural design?

Possible Answers	Respondents			
	A	B	C	D
• Operations management team	4	3	3	5
• Operations managers	4	4	3	-
• Operating personnel/staff	3	3	4	3
• Customers	5	4	2	2
• Shareholders	3	4	1	2
• Competitors	3	4	1	2
• Consultants	3	4	4	3
• Current and future partners	4	4	3	2
• Suppliers	4	3	4	2
• Other groups				

Only two of the respondents gave some relatively high points. The rest of the stakeholders' groups received moderate and low ratings from the respondents. This empirical result seems to deviate from our model where stakeholders' participation in the architectural design phase is concerned. By not giving any rate whatsoever, one of the respondents actually indicated that there is no need for the operations managers to participate during the architectural design phase. Another respondent considered the participation of shareholders and competitors as very minimal by giving the lowest rating on these stakeholder groups.

However, under the architectural design and according to the majority of respondents, operations management team, operation managers are actively more involved in the architectural design than other stakeholders such as, shareholders, competitors and customers that have been for example low rated by half of the respondents. When it comes to this question, respondents don't share the same opinion about the answers.

5.3.5. Understanding the criteria of determining the value of the future architecture

To what extent are the following terms of the future architecture model designed, valued in terms of attractiveness?

Possible Answers	Respondents			
	A	B	C	D
• Transparency (e.g. clear responsibilities)	5	4	3	5
• Awareness (e.g. taking into account all operational parts)	5	4	4	4
• Meaningfulness (the model's relevance for future activities)	5	4	3	5
• Efficiency	5	5	5	5
• Productivity	5	5	5	5
• Excellence (among the best)	5	5	-	3
• Uniqueness	5	3	3	1
• Flexibility	5	5	5	5
• Realizability	5	5	4	5
• Other terminologies	-	-	-	-

The terms that define the attractiveness of the future architecture according our respondents are efficiency, productivity, flexibility, realizability and awareness. Other terms like meaningfulness, excellence and uniqueness are not as relevant as the first ones according to a majority of respondents. In general the attractiveness terms are represented in our model and the answer of our respondents is consistent with your model.

5.3.6. Understanding the role of the Enterprise Architect in the architectural design phase

To what extent does the Enterprise Architect play the following roles in the architecture design?

Possible Answers	Respondents			
	A	B	C	D
• Teachers	5	4	4	2
• Listeners	5	5	3	4
• Creator / Architect	5	5	5	5
• Policymakers	-	5	4	2
• Mediator / conflict solvers	5	4	2	3
• Politicians" / negotiator	5	5	2	4
• Other roles	-	-	-	-

All our respondents agreed unanimously by giving the highest rating on the Enterprise Architect's role as a creator/architect. Other roles that the Enterprise Architect should fulfil as well include, teacher, listener or negotiator. The role as creator/architect corresponds very well with our model because the Enterprise Architect at this stage tries to create a proposal for change that includes the stakeholder's dreams, visions and ideas. That the enterprise assumes the role of listener indicate maybe that our respondents believe that the Enterprise Architect and the stakeholders in this phase also have a need for learning in order to gain an understanding of the process of developing a change proposals.

Another respondent who deemed it fit to consider the role of an Enterprise Architect as a policymaker with the highest rating, went ahead and gave very high points to the other roles of the Enterprise Architect as well. Thus, the two respondents provide a strong similarity between the empirical results and our model. However, the roles of an Enterprise Architect as teacher, policymaker, mediator, and politician/negotiator during this phase, have been given very low ratings especially by two of the respondents.

5.3.7. Understanding the type of decision taken in the architectural stage

To what extent does the Enterprise Architect understand the following kinds of decisions made during the architectural design phase?

	Respondents			
Possible Answers	A	B	C	D
• Rational (functional)	5	5	5	4
• Socio-cultural (regarding individual's work environment)	3	3	4	4
• Policy	4	4	3	2
• Economic	4	4	3	4
• Structural	5	5	4	5
• Strategic	5	5	3	5
• Contextual	4	-	-	5
• Holistic	4	-	-	5
• Infological (cognitive)	3	-	-	5
• Other				

We can deduce from the table above that the most relevant decisions made during this phase according to the respondents are rational, structural and economic and strategic. Aspects such as socio-cultural are not really included in the calculations in sufficient measure by half of the respondents. These results could mean that in this stage, respondents focus more on aspects of the technical system. Lastly, half of the respondents didn't have an opinion about the contextual, holistic and the infological decisions.

5.3.8. Understanding the outcome of the architectural design

To what extent can the following options be the result of architectural design?

Possible Answers	Respondents			
	A	B	C	D
• A root definition (goal-setting)	5	5	5	2
• Activity Model (As is)	-	5	3	2
• Activity Model (As it Could be)	4	5	2	3
• Activity Model (As Can Be)	4	5	4	4
• Activity Model (As Became)	1	5	3	4
• Action plan	3	4	4	5
• Resource Allocation	3	4	4	2
• Strategy	5	5	2	2
• Enterprise models	5	5	4	4
• Other options				

The results expected from this stage when we look at the table above is an enterprise model, an activity model (as can be), a root definition (goal-setting) and action plan above all. Other options like, activity model (as is) have been rated secondary, activity model (as it could be, as it became) and strategy.

5.3.9. Kinds of knowledge used by architects in designing and redesigning the architecture of the enterprise

To what extent does the provided knowledge or information belong to the following categories of knowledge?

	Respondents			
Possible Answers	A	B	C	D
• Objective knowledge/ rule-based knowledge	5	3	3	3
• Subjective knowledge /intuitive knowledge/tacit	3	4	4	3
• Inter-subjective knowledge/social knowledge	3	4	3	3
• Time-dependent knowledge (properties and relationships that are dependent on time. In other words, knowledge that represents changes in the state and relationships of objects)	5	4	4	3
• Time-independent knowledge (properties and relationships that are independent of time)	4	4	4	3
• Proactive knowledge (when we plan for the future)	5	5	5	2
• Reactive knowledge (when we react to the current internal or external events)	2	4	3	4
• Rational knowledge	3	3	4	3
• True knowledge (satisfying the correspondent's requirements)/ philosophical knowledge 4	4	4	4	3
• Other alternatives				

A majority of the respondents have chosen true knowledge, proactive knowledge, time-dependent knowledge and time-independent knowledge as the provided knowledge during this stage. This picture of reality agrees with our model but is not sufficient, since other kinds of knowledge like reactive knowledge, rational knowledge have been rated with low points and that's not what our model advocates for.

5.3.10. The knowledge base of architectural design

> *To what extent does the Enterprise Architect in order to design a holistic and meaningful Enterprise Architecture employ the following kinds of tacit knowledge?*

	Respondents			
Possible Answers	A	B	C	D
• Knowledge about the existing and coming IT technologies	5	5	5	3
• Knowledge dealing with human nature	4	4	3	3
• Knowledge about organizational design	4	4	3	5
• Knowledge about sources and principles for balance of power	4	4	2	4
• Knowledge about the design and functional reward systems	4	4	2	4
• Knowledge concerning the value system of an organization	4	4	3	4
• Other alternatives				

A majority of respondents believe that in order to design a holistic and meaningful Enterprise Architecture, knowledge about the existing and coming IT technologies should be employed above all. This can be because they keep in focusing into the technical part and relate architecture with technology. Knowledge about organizational design and knowledge dealing with human nature have been rated secondary. Lastly it's important to keep in mind that the human part is an essential part of the architecture.

5.3.11 Kinds of properties that determine the quality of a sound Enterprise Architecture

To what extent does the architect use the following essential properties in order to provide sound Enterprise Architecture?

	Respondents			
Possible Answers	A	B	C	D
• Simplicity	5	5	3	4
• Accuracy	4	3	5	4
• Efficiency	4	4	4	4
• Effectiveness	4	4	4	4
• Efficacy	4	3	4	4
• Ethicality	4	4	3	3
• Esthetical	5	5	3	2
• Wholeness	5	4	4	4
• Completeness	4	4	4	4
• Cohesiveness	5	-	4	4
• Comprehensibility	4	-	3	5
• Architectonic	5	-	5	5
• Other alternatives				

The properties that the Enterprise Architect uses to provide a sound Enterprise Architecture according the majority of respondents are simplicity, accuracy, efficiency, effectiveness, efficacy, wholeness, completeness, cohesiveness and architectonic. Ethicality and esthetical have been rated with low points by two of our respondents and with the highest points of the other half.

5.3.12. Understanding which category of knowledge that the Enterprise Architect uses in the architectural design phase

To what extent does the architect utilize the following categories of external and explicit knowledge?

Possible Answers	Respondents			
	A	B	C	D
• Technological	5	5	5	2
• Cognitive	4	4	4	3
• Organizational	4	4	3	4
• Political	4	4	2	2
• Reward	4	3	2	3
• Cultural	4	3	3	3
• Other alternatives				

We deduce form the information mapped in the table above that all respondents share the same opinion about how an Enterprise Architect should utilize the above categories of external and explicit knowledge. Technological knowledge has been rated with the highest points by three respondents, which can mean that these respondents still focus in technology. One of the respondents has given only 2 points to this kind of knowledge. Political and reward knowledge have been low rated by half of the respondents but high rated by the other half. Cognitive, organizational knowledge and cultural knowledge are seen as important but not relevant.

5.3.13. Maintaining a continuous dialogue with the stakeholders in order to obtain the required agreement about the approach to be followed

To what extent does the Enterprise Architect understand the kind of models that are relevant in facilitating the communication and dialogues between the stakeholders during the development process?

Possible Answers	Respondents			
	A	B	C	D
• Formal mathematical models, i.e. systems of equations	5	4	3	2
• Statistical diagrams	3	4	4	3
• Object models based on UML diagrams	4	5	2	3
• Rich pictures based on CATWOE techniques	4	4	4	3
• Metaphors given in natural language or visual language	5	5	5	4
• SWOT model	5	5	5	4
• PEST model	5	4	4	4
• Seminars/workshops	4	4	4	4
• Formal meetings	5	4	4	4
• Informal meetings	5	5	4	4
• Telephone contact	3	-	-	2
• Email	3	-	-	3
• Other alternatives				

According to the information above the language used for the stakeholders to communicate is based specially on SWOT and PEST model, rich pictures based on CATWOE techniques, metaphors given in natural language or visual language, formal and informal meetings and seminars/workshops and these results are similar as the one presented in the situation analysis. Some of the respondents don't see object models based on UML diagrams and formal mathematical models as important or relevant. We can deduce also that telephone contacts and email are not so popular.

5.4. Change Management

5.4.1. Understanding the importance and participation of stakeholders in the change management process

To what extent are the following categories of stakeholders involved and participate in change management?

	Respondents			
Possible Answers	A	B	C	D
• Leadership	5	4	5	4
• Customers	3	4	2	3
• Employees	4	3	3	3
• Local or Government authorities	1	4	2	2
• Global authorities	1	4	2	2
• Local society	2	3	2	2
• Other alternatives				

As we have seen in our theory chapter in this stage is very important that she stakeholders that participate actively reach a consensus so the new architecture can be implemented. All respondents have highly chosen the leadership as the most active stakeholder groups that participates the most. This may indicate that they believe that management team and managers are the ones dominates in this phase and that the Enterprise Architect should have the most contact with them and that the other members of the organization has not very much knowledge of this. We can deduce also that they see as not very important and relevant the other categories of stakeholders, which doesn't agree with our model, since the PED model considers all groups as relevant and important.

5.4.2. Understanding the role of the Enterprise Architect during the change management process

To what extent does the Enterprise Architect fulfil the following roles during the change management stage?

	Respondents			
Possible Answers	A	B	C	D
• As a teacher	5	4	3	2
• As a listener	4	4	3	3
• As a policymaker	5	4	2	2
• As a mediator/conflict solver	5	4	4	3
• As a "Politician"/negotiator	5	4	4	3
• As a change agent	5	-	-	5
• Other alternatives				

Its clearly from the table that all respondents that they see that the role that the Enterprise Architect should fulfil should be the role as a mediator and as politician and this is very consistent with our model since in this stage the term politic is very important as well as the stakeholders reach consensus so the Enterprise Architect should clearly be a politician and a conflict solver. The Enterprise Architect as a listener and a teacher are also some roles that she could fulfil in some way according the respondents

5.4.3. Representing the holistic perspective in the change management stage

To what extent are the following decisions essential in the change management stage?

Possible Answers	Respondents			
	A	B	C	D
• Rational	4	4	4	3
• Socio-cultural	3	3	3	3
• Political	3	4	3	3
• Economic	4	5	5	4
• Structural	4	4	4	5
• Strategic	5	5	5	5
• Formation of alliances	3	4	3	5
• Outsourcing	4	5	3	3
• Introduction of new technology	5	5	4	3
• Acquisition	4	4	4	3
• Other decisions	-	-	-	-

We see from the information in the table that the respondents share the same opinion about the decisions that are essential in the change management stage. The highest rated decisions are the economic, structural, strategic and introduction of new technology. Surprisingly the political decision is not rated with the highest points which is wrong since politics at this stage are very important

5.4.4. Understanding the output of the change management stage

> *To what extent does the Enterprise Architect consider how the result of change management should to be?*

Possible Answers	Respondents			
	A	B	C	D
• Likely root definition/architecture (goal-setting)	5	2	4	-
• Activity Model (As is)	3	4	2	-
• Activity Model (As Could be)	-	3	3	-
• Activity Model (As Can Be)	3	3	4	-
• Action Plan	5	4	4	-
• Resource Allocation	4	4	4	-
• Other alternatives				

The results acquired in this phase are to some extent a model that describes an action plan and resource allocation according to the majority of the respondents. Activity model (as is, as could be, as can be) and a root definition are not seen as very relevant.

5.4.5. Understanding the nature of (enterprise) alignment from a holistic perspective

To what extent does the Enterprise Architect understand and evaluate the Enterprise Architecture from a holistic perspective (stakeholders' expectations or requirements through the contribution of the enterprise as a whole)?

	Respondents			
Possible Answers	A	B	C	D
• Rational alignment	4	4	4	3
• Rational desirability and cultural feasibility	4	5	4	3
• Social (direct and indirect stakeholders) satisfaction (win/win)	4	4	4	3
• Employees' satisfaction	5	3	3	4
• Customer satisfaction	5	5	4	2
• Shareholders' satisfaction	4	5	2	2
• Community satisfaction	4	3	2	3
• Partner satisfaction	4	4	3	4
• Competitor satisfaction	3	4	1	2
• Sustainable satisfaction (long-term)	5	4	4	5
• Other				

Respondents have answered to some extent in the same way to this question. Sustainable satisfaction, customer satisfaction, rational alignment, rational desirability and cultural feasibility, employees satisfaction are the expectations or requirements that the Enterprise Architect uses for understanding and evaluating the architecture from a holistic perspective. Other requirements as competitor satisfaction, community satisfaction and shareholders satisfaction haven't been rated highly from some of the respondents. The respondents also see social satisfaction as relevant and important.

5.4.6. Maintaining a continuous dialogue with the stakeholders in order to obtain the required agreement about the approach to be followed

To what extent does the Enterprise Architect understand the kind of models that are relevant in facilitating the communication and dialogues between the stakeholders during the development process?

Possible Answers	Respondents			
	A	B	C	D
• Formal mathematical models, i.e. systems of equations	3	4	2	2
• Statistical diagrams	-	4	2	3
• Object models based on UML diagrams	5	5	3	2
• Rich pictures based on CATWOE techniques	-	4	4	3
• Metaphors given in natural language or visual language	4	5	5	4
• SWOT model	2	4	3	4
• PEST model	2	4	-	4
• Seminars/workshops	5	4	4	4
• Formal meetings	4	5	4	4
• Informal meetings	4	4	5	4
• Telephone contact	2	2	-	2
• Email	1	-	-	3
• Other alternatives				

According to the respondents, there are many ways which facilitate the communication between the stakeholders during the development process, and the results are very similar to the same question in previous stages. That is to say, informal meetings, formal meetings, seminars/workshops; metaphors given in natural language or visual language have been given high points by our respondents. Other ways of communication like email or telephone contact are not as popular as ways for communication between stakeholders. Rich pictures based on CATWOE techniques, statistical diagrams and mathematical models have been rated with high points by some respondents and with low points by others.

5.4.7. Understanding the criteria that can ensure change acceptance and success in the change management process

To what extent does an Enterprise Architect consider that the following criteria can secure change acceptance and success in the change management process?

	Respondents			
Possible Answers	A	B	C	D
• Systemic" sustainability (profitability requirements)	2	-	4	3
• Cultural sustainability (the change is not contrary to the company's culture, values, etc.)	3	-	4	3
• Social sustainability (the change is not contrary to the company's social relationships)	2	-	5	3
• Transparency (the change does not involve unclear responsibilities)	3	-	5	3
• Awareness (that change will not ignore any of the business parts)	5	-	4	3
• Holistic attractiveness (meaningfulness)	3	-	5	4
• Change in scope of the measure	1	-	3	3
• Other possibilities				

We see that respondent B has not given any answer to this question. We can deduce from the answers of the rest of the respondents that they don't see the criteria mapped in the table above as relevant for securing change acceptance and success in the change management process. These answers are not consistent with our PED model.

5.4 Enterprise Architecture implementation

5.5.1 Understanding the factors behind a successful implementation of the designed architecture

To what extent does the Enterprise Architect understand the critical factors related to a successful implementation?

Possible Answers	Respondents			
	A	B	C	D
• Implementability	5	5	4	5
• Ensuring maintenance of the organizational design	3	4	3	5
• Influence, pressure	4	3	1	4
• Ensuring reduced dependency on the designer	4	4	4	4
• Other alternatives				

Respondents' believe that implementability and ensuring reduced dependency on the designer are the critical factors to a successful implementation. However, two of the respondents have rated with low points the alternative influence, pressure. Ensuring maintenance of the organizational design has received the highest points from one of the respondents and has been rated as important by the other respondents as well.

5.5.2. Understanding the role of the Enterprise Architect at the implementation stage

> *To what extent does the Enterprise Architect understand his/her role in the implementation stage?*

	Respondents			
Possible Answers	A	B	C	D
• Teacher	5	5	4	2
• Listener	3	5	1	3
• Creator / Architect	3	5	4	5
• Policymaker	3	5	4	3
• Mediator / conflict-solver	5	5	2	3
• Politician" / negotiator	5	5	2	2
• Other roles				

According to a majority of respondents the Enterprise Architect assumes the role of teacher and creator, which is partly consistent with our model. This means that the Enterprise Architect will teach the organization about the various aspects of change. That the respondents see the Enterprise Architect as the creator/ architect may indicate that they believe that in this phase the Enterprise Architect focuses in implementing the change and, therefore, creates new conditions. One of the respondents believes that the Enterprise Architect should fulfil all the roles and another one does not believe that the roles of a mediator and conflict solver are relevant.

5.5 Explicit Architectural Knowledge

5.6.1 Understanding the importance of explicit knowledge in the Enterprise Architect's role and responsibilities

To what extent does the Enterprise Architect understand the kind of explicit knowledge (generic or specific) that is necessary for his or her role and responsibilities?

Possible Answers	Respondents			
	A	B	C	D
• Applying system thinking in the area of architectural design	4	5	5	5
• Architectural theories in form of Enterprise Architecture frameworks	4	5	5	5
• Evaluation theories of design	4	5	4	5
• Specific approaches to architectural modeling techniques	4	5	5	4
• Specific theories of functional alignment (Information economics)	4	4	4	5
• Specific theories of structural alignment (informational politics)	4	4	4	5
• Specific theories of info-logical alignment (Reach and Richness)	4	4	4	5
• Specific theories of socio-cultural alignment (win/win)	5	3	3	5
• Specific theories of contextual alignment (lawful behavior, etc.)	4	4	4	5

All respondents share the same understanding about the kind of explicit knowledge that is necessary for the Enterprise Architect's role which is consistent with our model that advocates that design knowledge is both generic and specific. In the first case, a design can be visualized through different kinds of holistic (total) enterprise models whereas in the second case, theories try to explain the different kinds of alignment that together express a sense of harmony and disharmony respectively.

5.7. Other Characteristics of Enterprise Architect

5.7.1. Tasks and responsibilities

To what extent do the following tasks and responsibilities define the role of the Enterprise Architect?

Possible Answers	Respondents			
	A	B	C	D
• Responsible for executing the architectural vision for IT systems within the organisation including those that support internet applications'	2	5	5	5
• Ensuring that architecture conforms to enterprise standards.	3	5	4	5
• Provide technical and architectural direction to the software and infrastructure team.	5	4	4	1
• Stay constantly attuned to emerging technologies and recommend business direction based on those technologies.	4	5	4	3
• Provides technical expertise to peers and associates on overall distributed Enterprise Architecture and design.	3	5	3	2
• Assist in developing and maintaining strategies that result in efficient and effective use of enterprise core services.	5	5	5	5
• Strong conceptual and analytical skills.	4	5	5	5
• Experience in creating and defining new technology concepts and solutions.	5	5	3	2
• Java development experience preferably in an SAP Enterprise Portal environment.	1	2	2	1
• Experience in development of Segment Architectures that align with and enable agency strategic goals and business requirements.	5	4	3	5
• Other alternatives				

From the information mapped in the table above, we deduce that most of the respondents believe that the Enterprise Architect should be responsible for executing the architectural vision for IT systems within the organisations including those that support internet applications; ensuring that architecture conforms to enterprise standards; provide technical and architectural direction to the software and infrastructure team; stay constantly attuned to emerging technologies and have strong and analytical skills. Respondents don't believe that the Enterprise Architect should play all the roles.

5.7.2: Roles

To what extent does the role of an Enterprise Architect overlap with the following roles?

Possible Answers	Respondents			
		B	C	D
• Business architect	4	4	5	1
• Information architect	4	4	4	5
• Process architects	4	4	4	3
• IT architects	4	4	3	3
• Software architects	4	3	3	1
• Application architects	4	3	4	1
• Other alternatives	-	-	-	-

We see that respondents don't share the same opinion about the roles that an Enterprise Architect should fulfil. A majority of the respondents believe that an Enterprise Architect should overlap the roles as business architect, information architect, and process architect. IT, software and applications architects are not seen as relevant roles from a majority of respondents.

R4363: CSF to Success

What are the critical success factors which can help the architect to succeed?

RESPONDENT A:

Pragmatic approach

Stepwise approach

Create the architectures that make sense for the current change portfolio

Understanding the business, able to speak with business, while maintaining the high knowledge of the technology side

RESPONDENT B:

No Answer

RESPONDENT C:

Acceptance from business management as an critical skilled business management team-member.

Ability to visualise architecture models, pro's and con's, explain/communicate architecture "lingo" to business management

The theoretical can always be learned, but to get wide practical knowledge is much harder and is especial true for an EA.
Must have knowledge and talk the language, from other architect disciplines, know the customer business and be able to convert this into growing business value.
Commitment, right problem domain, right resources, infrastructure and so on

RESPONDENT D:

Remark: G3 and G4 must be discussed in a wider perspective for Business oriented IT management based on defined roles and responsibilities for the business architecture, for the IS architecture, and for operations.

R4364: Factors underlying failures

In your own opinion, what factors explain the future of an Enterprise Architect?

RESPONDENT A:

Wide knowledge and large experience

Understanding of business governance and development

The frequency of changing company environment

The shift of ownership and power to Asia

New style of managers that have more of strategy and architecture "built-in"

RESPONDENT B:

No answer

RESPONDENT C:

IT and its underlying architecture is a crucial part of the CORE business.

Not the right demands early in the right situation, which at large leads to an organization making wrong decisions. A common problem with this is as it's commonly exist strong characters in the organization group, other roles working for different goals, not the whole as the EA.

Right vision and mission, realization, communication, organization combination, stakeholder

RESPONDENT D:

Remark: G3 and G4 must be discussed in a wider perspective for Business oriented IT management based on defined roles and responsibilities for the business architecture, for the IS architecture, and for operations.

6. Discussion

The main purpose of our study is to provide a sound ground for understanding the role and competencies of the Enterprise Architect in a proactive enterprise development. Accordingly, we have focused on the process of proactive enterprise development from a circular rather than linear perspective thereby creating a model of proactive enterprise development (PED) aiming at elucidating the following main question of our inquiry:

"What are the essential roles and competencies of an Enterprise Architect in relation to proactive enterprise development?"

We have defined the concept of proactive enterprise development as consisting of six constitutional parts namely:

1. Strategic situation analysis

2. Vision, Mission and Strategy (Root architecture)

3. Architectural design

4. Change management

5. Architectural implementation

6. Strategic situation analysis (New start where new enterprise identity has been identified)

The above domains of interest have been studied and elucidated both theoretically and empirically. Therefore, in this section we try to discuss the similarities and differences between these two parts of knowledge (theoretical and empirical) as we have documented in our study in chapter 4 and 5 in relation to the various roles played by the Enterprise Architect in a proactive enterprise development context.

According to our opinion, we have identified three very essential roles of the Enterprise Architect. These are: architect as an agent of change; architect as a facilitator for supporting the creation of root architecture; and architect as the expert of creating architectures that shape alternatives futures of the enterprise, hence designer. Furthermore, other essential roles that we have identified include architect as a conflict resolver among various stakeholders especially during the creation of a new root architecture and while dealing with the issue of establishing shared awareness during the change management phase and architect as a coordinator during the architectural implementation of the negotiated changes.

These various roles of the Enterprise Architect are illustrated in the following figure below:
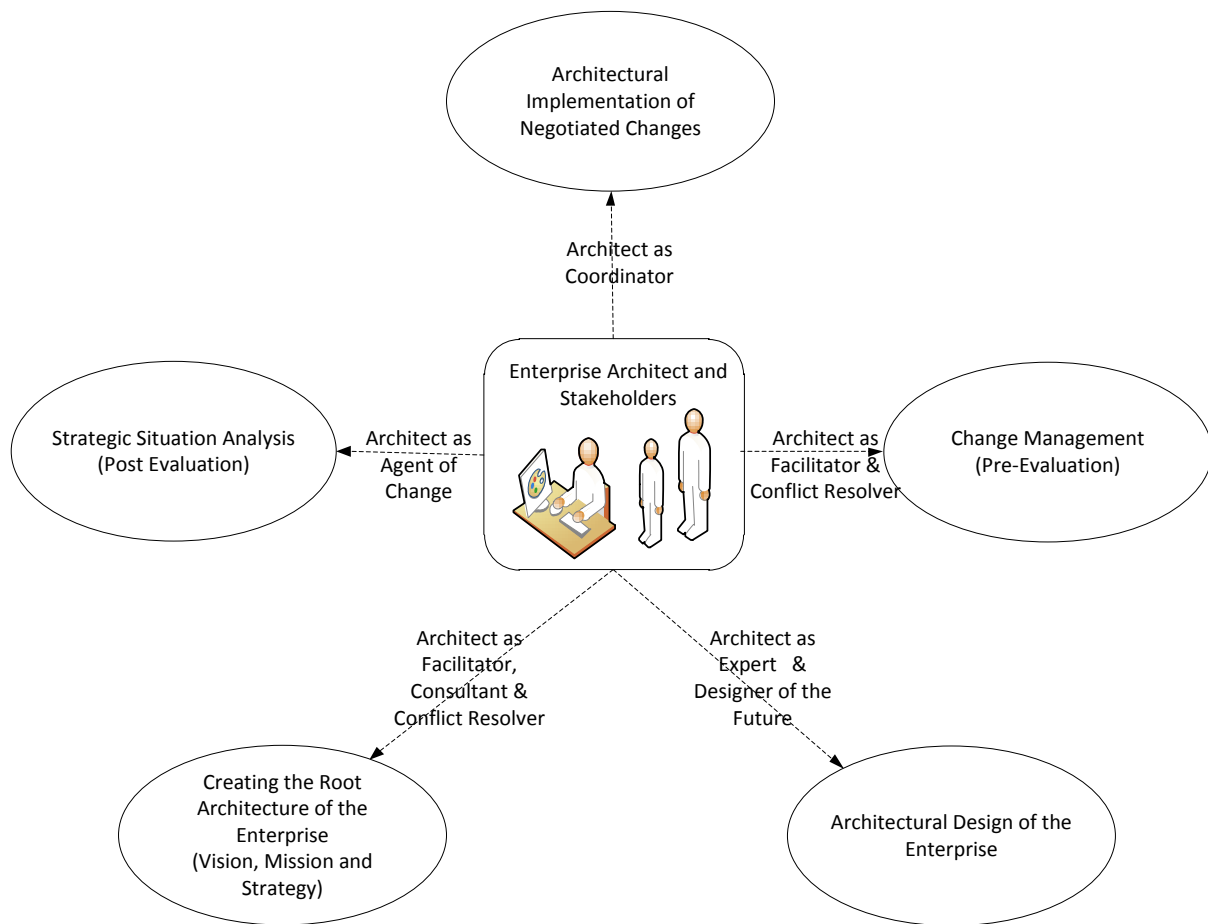
Figure 13: *The Roles of the Enterprise Architect with reference to the PED model*

Changes = Future Architecture – Current Architecture
Future Architecture = Current Architecture + Architectural Changes

6.1 Enterprise Architect's Role in Strategic Situation Analysis

With reference to our model, we have observed that one of the primary roles of the Enterprise Architect within the domain of strategic situation analysis is acting as an *agent of change*. Evidently, there is a strong empirical backing for our model regarding the role of an Enterprise Architect as a teacher and a change agent during this phase. As a change agent, the Enterprise Architect should support the management of the enterprise and the various stakeholders by promoting and establishing the best strategy to accomplish business objectives and goals after carrying out a strategic analysis of the current and future environment of the enterprise.

Furthermore, we have also noticed that there is a significant need to making a sound judgement by the Enterprise Architect regarding how to blend all the various communication models with stakeholders to ensure effective communication and dialog during the enterprise development process.

While examining the various models used by the Enterprise Architect in order to ensure a continuous dialog between the stakeholders, we have observed that there is strong empirical support for our model concerning the use of rich pictures based on CATWOE techniques; metaphors given in natural or visual language; seminars/workshops; and informal meetings.

6.2 Enterprise Architect's Role in formulating the Vision, Mission and Strategy of the Enterprise

With reference to our model, we have observed that the primary role of an Enterprise Architect within the domain of establishing root architecture is that of a *facilitator, consultant and conflict resolver*. As a facilitator, the Enterprise Architect plays a significant role in facilitating the formulation of the vision, mission and strategy of the enterprise hence, supporting the creation of the root architecture.

We have noticed a balanced empirical support of our model regarding the importance of the Enterprise Architect during the establishment of root architecture. This is very consistent with our model since we believe that root architecture forms the basis for sustainable Enterprise Architecture and provides a sound direction for a meaningful proactive enterprise development. Moreover, another point that we can deduce is that root architecture has been recognised as the ground for a long-term perspective in enterprise development.

Furthermore, as a *consultant*, the Enterprise Architect should have a good understanding regarding the constitutional parts of the root architecture of the enterprise which include mission, vision, ultimate purpose, core values, core activities goals and objectives, stakeholders' expectations, and so forth.

We emphasize the fact that the Enterprise Architect needs to appreciate the importance of understanding the correct way for establishing the root architecture. Based on our general observation, there is a substantial empirical support for our model concerning an Enterprise Architect's need for understanding the current state of the root architecture or how it should be established. Furthermore, the attempt by the Enterprise Architect to understand the establishment of root architecture by the power of a dominated coalition over any other stakeholder; by the leadership of the enterprise; and by a meaningful way accepted by stakeholders' utopic views, did not receive strong empirical support for our model hence an indication of a considerable deviation from our model.

We have identified very strong empirical backing for our model regarding the extent to which the Enterprise Architect should understand the criteria that the root architecture must fulfil in order for it to gain acceptance. This strong empirical support has been particularly revealed by the criteria related to rational performance and cultural feasibility and the one related to satisfying the leadership of the enterprise. However, there has been some deviation from our model in relation to the social symmetry and equity criterion together with the criterion of voting between the stakeholders criterion, hence a weaker empirical support for our model in this area.

Due to the stakeholders' varying views and opinions that are associated with the formulation of the vision, mission and strategy of the enterprise, we have observed that the Enterprise Architect can play a vital role as a *conflict resolver*. This is what Strano and Rehmani, (2007) refer to as the role of an arbitrator where the Enterprise Architect helps in balancing the disparate needs of people, management, and business requirements.

6.3 Enterprise Architect's Role in Architectural Design

It is within the domain of architectural design that the essential role of an Enterprise Architect as an *architect, creator or designer* really is more pronounced. Since this is the domain where the designing and redesigning of the architecture of the enterprise is carried out, it is of paramount importance that the Enterprise Architect develops a clear understanding of the essential parts that make up the architecture of the enterprise. It should be noted that the architecture of the enterprise does not necessarily refer to the technical components such as information systems, information infrastructure, and business processes alone. Architecture also covers other aspects such as stakeholders; employees; enterprise purpose, vision, mission and strategy; structure of authority and responsibilities, among others.

Consequently, we have observed very strong empirical support for our model regarding the need for the Enterprise Architect to grasp all the essential parts of the architecture of the enterprise. Nevertheless, we have noticed that some essential parts of the architecture such as employees, stakeholders and managers did not receive substantial empirical support for our model in this regard. Our model maintains that architecture is not about technology alone, hence we believe that the human component is very important and essential as well.

It should be noted that our model has received a very strong empirical backing regarding the need for an enterprise to ensure that he/she is conversant with the various kinds of relationships that exist between the information systems and the essential parts of the Enterprise Architecture. However, it should be noted that cognitive relationships, decisional relationships, socio-cultural relationships, and purposeful relationships, revealed some moderate empirical support for our model.

Furthermore, our model has received outstanding empirical support concerning the Enterprise Architect's need for understanding the various forms of interoperability that belong to the architecture of the enterprise. A closer observation indicates that information-based integration, collaboration, standardization, and information-based differentiation are the forms of interoperability that have received much empirical support. Nevertheless, there was a significant empirical deviation from our model regarding coordination as a form of interoperability that the Enterprise Architect ought to understand.

The issue of understanding the role and importance of stakeholders during the architectural design phase received strong empirical support for our model while the rest of the stakeholders' groups received moderate empirical support for our model. However, there was a slight deviation in support for our model where support for the operations managers, shareholders and competitors were concerned.

On the issue of understanding the role of the Enterprise Architect during the architectural design phase, there is an outstanding empirical support for our model regarding the various roles of an Enterprise Architect which include creator/architect, teacher, policymaker, mediator, and politician/negotiator. However, there are some minor empirical deviations regarding some of the roles of an Enterprise Architect during this phase.

6.4 Enterprise Architect's Role in Change Management

We have identified the primary role of an Enterprise Architect in the change management phase as that of being a *facilitator* and *conflict solver*. Pertaining to the domain of change

management, we have identified strong empirical support for our model mainly with the leadership group of stakeholders as being the one that should participate the most during the change management phase of the proactive enterprise development process. However, the group of stakeholders such as local or government authorities, global authorities, and local authorities did not receive substantial empirical support for our model.

We believe that stakeholders' direct and indirect participation in the change management process is very vital in relation to proactive change management. On the question regarding who should participate in the change management process, we have not received a sustainable answer from our empirical findings. However, this does not impact the validity of our model (Hedberg, 1980). However, according to our model, any change is established through negotiation with all the parties concerned and not through autocracy or dictatorship. Such change is representative for all involved stakeholders and not just the leadership of the enterprise. We know that changes determined solely by the leadership of the enterprise create more conflicts, more misappropriation of resources, more absenteeism and more alienation, than socialization of the enterprise.

We see leadership power dominance in the case of expected effects by change management decisions. Accordingly, rational, economic, structural, rational decisions have the first place whereas socio-cultural and socio-political decisions are received the moderate empirical support. This is another divergence between the theoretical perspective and the empirical view. However, in the question dealing with the holistic perspective of the expectations, we have harmony between the theoretical and empirical views. This means that the involved respondents during our empirical study have either misinterpreted some question or they are inconsistent. Furthermore, perhaps they seem not to be secure or have the liberty of what to answer in this regard.

It is interesting to see that any change is determined through seminars and workshops, formal meetings or informal meetings and through the use of metaphors in natural or visual language. Other more forms of technical or professional technics or language are not adequate for such a domain of decision making especially during change management.

We believe that depending on the kind of business the enterprise engages itself in, various groups of stakeholders play a very significant during the change management process depending on the type of business and the type of change at hand. Therefore, stakeholders' involvement is critical at this stage. As a matter of fact, if some stakeholders are not given the opportunity to be part of the change management process, they can delay or even frustrate the progress of the enterprise development process by creating resistance against the implementation of the change project(s).

This deviates from our model to a certain extent since the PED model considers all groups as relevant and important during the change management process. Concerning the issue of understanding the role of the Enterprise Architect in the change management process, two of the respondents gave the highest points while the other two respondents gave some relatively lower points in this regard. We can therefore ascertain that there is a relatively moderate similarity in relation to our model.

Concerning the representation of a holistic perspective in relation to the essential decisions that should be carried out within the change management, there is a relatively strong empirical support for our model especially with regard to the rational, strategic, acquisition, economic,

and structural decisions. However, the socio-cultural and political decisions have received a moderate empirical support for our model.

Furthermore, there is evident of a strong empirical backing for our model on the importance of understanding the results of the change management process especially with regard to root definition/architecture, action plan and resource allocation. However, the Activity Model (As Could Be) and the Activity Model (As Is) have received some moderate empirical support for our model.

6.5 Enterprise Architect's role in Architectural implementation

In this domain, we believe that it is vitally important for the Enterprise Architect to grasp the essential factors which contribute to a successful implementation of the designed architecture. Therefore, the primary role of an Enterprise Architect that we have identified in the architectural implementation phase is that of *a coordinator of change*. Consequently, we have received strong empirical support for our model especially with on implementability and on the issue of ensuring reduced dependency on the designer. However, there was a deviation from the empirical support of our model regarding the critical factors of influence and pressure.

Furthermore, understanding the role of an Enterprise Architect as a teacher, politician, mediator, listener, creator/ architect and policymaker during the implementation stage has received significant empirical support for our model. However, there was a notable empirical deviation from our model regarding the role of a listener at this stage.

6.6 Other Essential Roles of an Enterprise Architect in a Proactive Enterprise Development

It should be noted that our model has received strong empirical support pertaining to understanding the explicit architectural knowledge by the Enterprise Architect. This explicit knowledge includes the following: applying system thinking in the area of architectural design; architectural theories in form of Enterprise Architecture frameworks; evaluation theories of design; specific approaches to architectural modelling techniques; information economics; information politics; reach and richness; specific theories of contextual alignment; and so forth. We believe that the Enterprise Architect's experiential and professional knowledge is extremely important in his various roles in order to foster proactive enterprise development.

Enterprise Architect's Role in Understanding the principle of non-separability in relation to root architecture

With reference to our empirical findings, we have observed that it is important for the Enterprise Architect to have an understanding of the non-separability that exists between the activities that establish the root architecture and those activities involved in the design and redesign of Enterprise Architecture.

However, we have found out that there is a strong similarity in the empirical material that deals with the Enterprise Architecture and moderate similarity to the concept of the root architecture of the enterprise. Figure 19 below is used to demonstrate this finding:

 A possible explanation can be derived from the following consideration. This is because in many approaches, there is a clear distinction between strategic formulation of vision, mission, and so forth with reference to architectural design as belonging to different processes. However, in our model, both activities belong to the strategic development of the enterprise. We cannot define architecture without making any reference to root architecture.
In summary, it should be noted that our model is based on approaches where purposeful sustainability (long-term perspective) is a significant issue and therefore any current or future architecture must refer to root architecture. In summary, our model is based on non-separability between the root architecture and any form of Enterprise Architecture.

Either we refer to the same or different vision. The case of different vision impact radical changes whereas the case of the same vision impacts just changes in the same architecture. The relationship between the root architecture and the Enterprise Architecture in our model is moderately too weak. The possible explanation of this weakness is either due to communicative issues or because the question of strategy (root definition) and the question of architectures don't belong to the same process. In other words, they are independent of each other. However, according to the ground of our model, strategy and root architecture belongs to the same process. This is the principle of non-separability. The same observation is considered by Ross et al. (2006) when they talk about Enterprise Architecture as strategy. They consider that the relationship between architecture and strategy is clear.

In order to understand the requisite of non-separability and its interpretation, we must understand the nature of architectural design of the enterprise in terms of change and stability.

Thus, it is important to understand the extent to which the essential relations of the Enterprise Architecture remain stable or change; and the extent to which the nature of the essential relationships of the Enterprise Architecture remain stable or change.

The Enterprise Architect's role in relation to organizational overview
Furthermore, another role of the architect is to have in mind a holistic process of the so-called proactive enterprise development. From an architectural standpoint, it is vitally important that the Enterprise Architect creates a general overview of the entire organization especially in those organizations characterized by complexity. In essence, the larger an organization is, the more complex it becomes since it comprises of a number of departments, various programs and systems together with several employees that run such an organization. It is the work of an architect to promote a general overview of such an organization since it becomes very difficult to design a viable architecture without a proper understanding of the current structure of the organization. Furthermore, ensuring management of the organization without first establishing a general overview of the entire organization can also prove to be very difficult, hence the importance of an Enterprise Architect.

The Role of An Enterprise Architect in relation to stakeholders

The role of an architect is to listen to the stakeholders in order to create an Enterprise Architecture that can facilitate win/win effects and minimize the win/lose effects of the various projects within the organization. By developing a holistic view of the enterprise where proactive enterprise development is concerned, the stakeholder needs to ponder on a number of questions such as: Who are the stakeholders? What is the external and internal reality that should be architected? Is there any problem indicating the need for architecting; need for comprehensibility; need for rationality; need for innovation; need for manageability; need for the feasible kind of approach to be employed; and so forth? By endeavouring to search for the appropriate answers to such questions and other related questions, the Enterprise Architect will set on the road to creating win/win effects rather than win/lose effects during the process of a proactive enterprise development.

The Enterprise Architect's Role in choosing proper methods

The Enterprise Architect is responsible for choosing the proper methods, language, organizational forms, at the right time and in the right place so that every time he or she contacts the stakeholders, it leads to strong comprehension, strong shared-awareness, and shared meaningfulness. The use of formal and informal language as a means of communication by the Enterprise Architect also plays a very significant role in impacting proactive enterprise development.

The Enterprise Architect's role in participative Decision-Making

Most organizational projects fail not only due to lack of proper knowledge base but also failure to recognize the vital role played by participative decision-making by literally engaging all the stakeholders. It should be noted that although knowledge is a necessary factor in establishing an organizational overview, knowledge alone is not enough to ensure a meaningful change that is why it is important for the Enterprise Architect to ensure that various stakeholders are involved in participative decision-making. CATWOE is one of the methods that can help the Enterprise Architect in identifying the various stakeholders within an organization. In other words, CATWOE helps the Enterprise Architect in identifying those who will participate in the process of enterprise shaping, hence Enterprise Architecting.

According to our model, shared-awareness and understanding is not enough to establish and re-establish a sound design of the enterprise. Such a design presupposes participative decision making whereby all the interested parties (or their representatives) decide the form, structure and logic of their future reality. It should be noted that whereas design is related to the designer's thoughts, implementation is related to action; that is to say, putting the thoughts of the designer into reality. Acting can be sequential, parallel, independent or proactive, and so forth. Furthermore, after the change management phase, we can have many parallel projects which can be carried out independent from each other.

Win/lose means that at the end of the day, some gain while others lose or the other way round. Whereas some are very motivated by change, others are demotivated by it and without motivation the capabilities are limited and the resistance is unlimited.

With reference to the various domains of our model, the primary roles of an Enterprise Architect can be summarized as follows:

Strategic Situation Analysis: During this phase, the primary role of an Enterprise Architect is a listener as well as an agent of change because he knows how the macro environment impacts and changes everyday environment of business and this knowledge is something that is meaningful to the stakeholders in order to understand and redefine the future reality of the enterprise.

The domain of establishing Root Architecture: During this phase, the role of an Enterprise Architect can be seen as a coordinator who aims at systematizing and organizing the future goals and expectations of the stakeholders. Whereas some of these expectations have a short-time horizon, other stakeholders' expectations are of a more long-term nature. These expectations are the grounds upon which the proactive Enterprise Architecture should be based.

Architectural design of enterprise: Here the roles and capabilities of the Enterprise Architect are given in terms of capabilities that enhance the creation of alternative views or scenarios of the future. This presupposes either the creation of a new architecture based on a new purpose (as in the case of re-orientation) or the redesigning or re-implementation of the existing architecture (as in the case of re-optimization, reconstruction and reorganization). In the latter scenario which is associated with redesigning the existing architecture, the purpose of doing so remains the same and the changes concerned. The changes we are referring to here are those changes in the infrastructure or those changes in the design.

Change management: During this phase, the primary role and responsibility of an Enterprise Architect is to become a teacher or an independent conflict solver because every change that takes place within the architecture of the enterprise will have a significant positive or negative impact on the interests of stakeholders. Therefore, any form of redesign should be established by way of negotiation and should have the acceptance of all the stakeholders. Consequently, such design leads to win/win effects rather than win/lose effects. Today we have much more unsuccessful investments in architectural design rather than successful ones because they allow social asymmetries; which in other words refer to the existence of inequalities between the primary different parties of the enterprise.

Architectural Implementation: At this stage of implementing the negotiated or accepted changes, the Enterprise Architect supports all the actors involved within the enterprise during the implementation of the negotiated changes. However, such changes concern simultaneous changes in the form, structure and logic of the enterprise, required competences as well as redesigning or establishing new information systems and/or information systems architecture. In summary, changes within the enterprise, competences and information systems, must follow the same clocks of development; otherwise there will be a misalignment that the Enterprise Architect has accepted to be established. Therefore, the support of architect can be given in terms of sound cooperation and coordination of the change activities of all the parties involved. Such activities belong in the first case to the proactive one rather than the reactive.

7. Conclusions

We have been able to draw three main conclusions in our endeavour to satisfy the main purpose of our study and this has been done through the elucidation of the following question: *"What are the essential roles and competencies of an Enterprise Architect in relation to proactive enterprise development?"*

First and foremost, the Enterprise Architect may be seen as an agent of change because he/she is capable of seeing the future impacts of technology in general and social trends in particular on the enterprise and hence be able to guide the stakeholders towards a new vision of the enterprise. Thus, this new vision can help update the root architecture of the enterprise i.e. new identity and therefore new orientation of the future enterprise. In other cases, when the old vision remains the same, the role of the architect is to collect and organize the opinions of stakeholders above the dysfunctional issues of the current Enterprise Architecture.

Secondly, another main role of the Enterprise Architect is to use his/her capabilities in terms of external base of knowledge i.e. educational knowledge, as well as internal base of knowledge i.e. tacit experiential knowledge in order to guide the formation of a new root architecture i.e. purpose, strategy, culture, relevant core-actions, expected behavior, and other such ideas of the enterprise. Such formation takes place in cases where stakeholders have stated a new vision for the future. There are some essential differences between root definition in Checkland's model (1985) and root architecture in our model. These can be summarized as follows:
1. The content of root definition is more extensive in our PED model.
2. Root architecture belongs to the theoretical view of design. However, in PED model, root architecture is established through negotiation rather than speculation.
3. The third and most essential change in root architecture initiate the need of a radical architectural design of the enterprise and therefore all the kind of changes such as cases of re-optimization, reconstruction and re-organization are changes that affect the current architecture.

Thirdly, the last essential role of the Enterprise Architect is to convert the root architecture or the opinions of the stakeholders into alternative Enterprise Architectures for the future. The main function of such architectures is to create awareness in general and mutual awareness in particular between the stakeholders. Such awareness should lead to well-articulated and negotiated change decisions aiming at indicating what should be changed in the enterprise as a whole. However, only when the negotiated changes have been implemented, should the effects of changes be expected. Therefore, the effects of implemented changes should be close to the stakeholders' expectations.

In a nutshell, although we have only been able to interview a few respondents, our model which is based on well-established theoretical grounds has received strong empirical support. Hence, our model provides a meaningful ground for understanding the role and competencies of the Enterprise Architect in a proactive enterprise development. There is an essential difference between our model and those models that exist today with respect to the roles and responsibilities of an Enterprise Architect since our model presents an integrated approach towards a proactive enterprise development (PED-Model). Our model is process oriented as well.

8. References

Al-Mashari, M., Al-Mudimigh, A., & Zairi, M. (2003). Enterprise resource planning: A taxonomy of critical factors. *European Journal of Operational Research,* Vol. 146, pp. 352-364.

Backman, J. (1998). *Rapporter och uppsatser.* Lund: Student litteratur.

Blixt, J., & Svärdström, J. (2002). *Hur bedömer vi utvecklingens samordningsgrad?.* (Magisteruppsats). Handelshögskolan vid Göteborgs universitet, Institutionen för informatik, 405 30 Göteborg.

Bredemeyer, D. (2002). What it Takes to be Great in the Role of Enterprise Architect. Bredemeyer Consulting. Enterprise Architecture Conference.

Checkland, P. (1985). From Optimizing to Learning: A development of Systems Thinking for the 1990s. *Journal of Operational research Soc.,* Vol. 36, No. 9: pp. 757-767.

Checkland, P. (1995). Soft Systems Methodology and its Relevance to the Development of Information Systems. In Stowell, F.A, *Information Systems Provision: the Contribution of Soft Systems Methodology*. London: McGraw-Hill.

Checkland, P., Holwell, S. (1998). *Information, Systems and Information Systems – making sense of the field.* Chichester: Wiley.

Churchman, C. W. (1971). *The Design of Inquiring Systems: Basic Concepts of Systems and Organization*, Basic Books.

Ellinger, S. R. (2009). The Role and Development of an Enterprise Architect. Ph.D. thesis, Northrop Grumman.

Gunther, E., &Jaworski, P. (2004) Konsultens roller i IT-baserad verksamhetsutveckling – en ny modell för att förstå hur klientens visioner, idéer och drömmer kan bli verklighet, Magisteruppsats, Handelshögskolan vid Göteborgs universitet, Institutionen för informatik, 2004-05-26(Swedish).

Hedberg, B. (1980). Using Computerized Information Systems to Design Better organizations and jobs. I N. Björn-Andersen, red. *The Human Side of Information Processing.* North-Holland Publishing Company.

Hernes, G. (1979). Om bruk av økonomiske modeller i sosiologien 7, 1979, Arbeidsnotat nr 7, 1979, NAVF:s senter for samfunnsvitenskapelig forskeutdaning ved Universitetet i Bergen, Norway(Norwegian).

Holme, I. M., & Solvang, B. K. (1997) Forskningsmetodik – om kvalitativa och kvantitativa metoder (Swedish), Studentliteratur, Lund, Sweden.

Hugoson, M.-Å. (1990). *Verksamhetsbaserad Systemstrukturering*. NordDATA 90, Göteborg.

Hugoson, M.-Å. (1990). *Verksamhetsbaserad Systemstrukturering. Principer och tillämpningar*, Göteborg, Programator AB.

Hugoson, M.-Å. (1991). Autonomitet och samverkan mellan datorbaserade ledningssystem. I Försvarsmedia, *Ledning och beslutsfattande*

Hugoson, M-Å, Magoulas, T., & Pessi, K. (2008). Interoperability strategies for business agility, IT University of Gothenburg, Sweden, Jönköping International Business School, Sweden.

Høivik, T. (1974). Mål og metode (Universitetsforlaget, Oslo, Norway 1974) (Norwegian)

IEEE STD 610.12. (1990) Standard Glossary of Software Engineering Terminology, IEEE, May ISBN:155937067X (1990).

Jensen, C. T., Cline, O., & Owen, M. (2011). Combining Business Process Management and Enterprise Architecture for Better Business Outcomes, IBM International Technical Support Organization, Redbooks (March, 2011).

Langefors, B. (1974). Some Approaches to the Theory of Information Systems. I D. Cougar and R. Knapp, red. *System Analysis Techniques*, John Wiley & Sons**.**

Langefors, B. (1975). Control Structure and Formalized Information Analysis in Organizations. Grochla I. E., and Szyperski, N. red. *Information Systems and Organizational Structure*. Berlin and New York, Walter de Gruyter**.**

Langefors, B. (1978). Analysis of User Needs. Bracchi I. G., and Lockermann, P. C., red. *Information Systems Methodology*. Berlin, Springer-Verlag**.**

Magoulas, T. and Pessi, K. (1998). "Strategisk IT-management". Ph. D. Thesis, Göteborg: Göteborgs University, Department of Informatics.

Mackenzie, K.D. (1984). *A Strategy and desiderata for organizational design*. Human Systems Management 4. North Holland.

Nickols, F. (2006). *Change Management 101, A Primer*. Distance Consulting.

Ross, J. W., Weill, P., & Robertson, D. C. (2006). Enterprise Architecture as Strategy: Creating a Foundation for Business Execution, Harvard Business Press, Boston, Massachusetts, USA.

Schöenherr, M., & Aier, S. (2008). Sustainable Enterprise Architecture – Central (EAI) Vs. Decentral (SOA) Approaches to define and establish flexible Architectures. Research Paper, Technical University of Berlin, Department of Business Informatics, Berlin Germany.

Sessions, R. (2006). A Better Path to Enterprise Architecture, Sponsored by Microsoft Corporation, ObjectWatch, Inc. March 21, 2006 1.0

Simon, H. (1962). The Architecture of Complexity. *Proceedings of the American Philosophical Society,* Vol. 106**,** No**.** 6: 467-482.

Steghuis, C., & Proper, H. A. (2008). Competencies and responsibilities of Enterprise Architects, A jack-of-all-trades? In J.L.G. Dietz, A. Albani, and J. Barjis, editors, Advances in Enterprise Engineering I, June 2008, number 10 in LNBIP, pages 93-107, Berlin, Germany, EU, 2008. Springer. ISBN-13: 9783540686439.

Strano, C., & Rehmani, Q. (2007). The role of the Enterprise Architect. Springer-Verlag.

Straus, D., & Doyle, M. (1978) JAE, Vol.31, No.4, Designing with Communications: How Architects and Environmental Designers Use Media in Shaping the Built Environment (Apr., 1978), pp. 13-15, Blackwell Publishing, Association of Collegiate Schools of Architecture, Inc.

Svärdström, Magoulas, T., & Pessi, K. (2006). *FEM – A Framework for understanding Enterprise Morphology.* IT-Universitet I Göteborg. Draft 2006.

Tichy, N.M. (1983). *Managing Strategic Change – Technical, Political, and Cultural Dynamics.* Chichester: John Wiley & Sons, Inc.

Van der Raadt, B., & Van Vliet, H. (2008). Designing the Enterprise Architecture Function. Department of Computer Science. Springer-Verlag Berling Heidelberg.

Walker, M. (2007). A Day in the life of an Enterprise Architect. MSDN Enterprise Architecture Center.

Electronic references:

Abductive reasoning (2008) [Electronic] Available from:

<http://en.wikipedia.org/wiki/Abductive> (2012-05-20)

CAEAP. Enterprise Architecture Doctrine. Center for the Advancement of the Enterprise Architecture Profession [Electronic] Available from:

<http://caeap.org/Doctrine.aspx>

Charles Peirce (1839-1914) [Electronic] Available from:

<http://en.wikipedia.org/wiki/Charles_Peirce> (2012-05-20)

EVRY [Electronic] Available from:

<http://www.evry.com/corporate/about/about-evry/> (2012-05-20)

Tosti D T and Jackson S F (2003) Organizational Alignment, iChangeWorld Consulting [Electronic] Available from:

<http://www.ichangeworld.com/docs/icwOA0303.pdf> (2012-05-20)

9. Appendices

9.1 Appendix 1

Mackenzie's Desiderata

1. **Agreement regarding the process to be followed rather than the result to be achieved**. The client organization is often unclear as to how the final design will look like at the beginning of a given period of change. Instead of starting with a conclusion (e.g. "this is the problem, now we will fix it"), the steps in the design process should be discussed and a consensus on how the process should look like should be created. It is important to maintain a continuous dialogue with the client during the process, as this will make it easier to make sure that there is really an agreement on the design work (Mackenzie, 1984).

2. Completeness of the analysis.

An organizational design must be a complete outcome of the following combination of A, B, C and E, where A stands for goals and strategies; B stands for design assumptions, organizational logic, organizational architecture and the actual organization; C stands for performance; and E stands for the surrounding environment. Consideration must also be given to the transitions between the different parts. Figure X below illustrates Mackenzie's (1984) ABCE model.
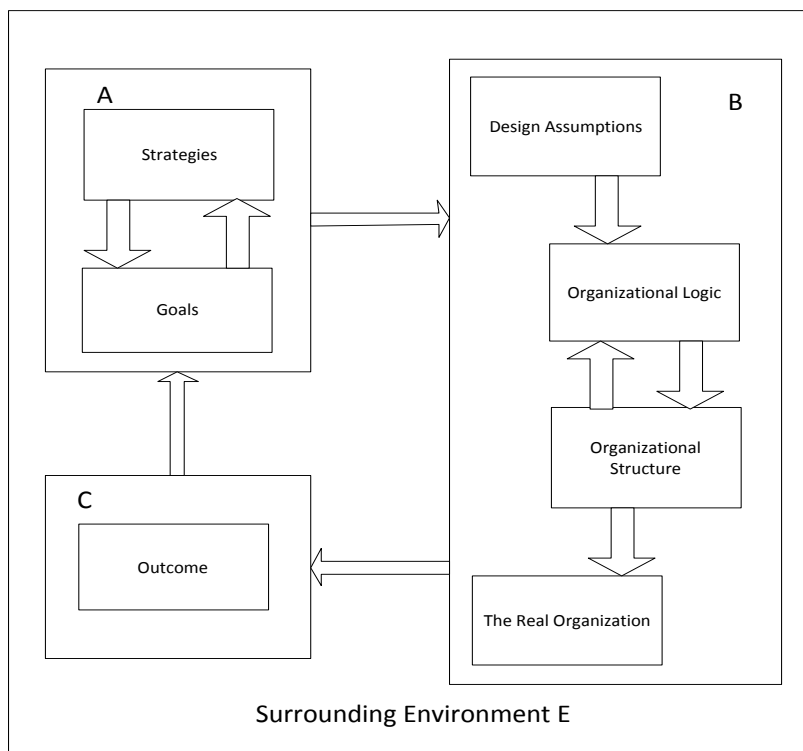

Figure X *ABCE Model (Adapted from Mackenzie, 1984)*

3. Cost Effectiveness

The design process should be cost effective. Organizational design is costly both in direct costs and expenses of man-hours. A step towards being cost effective is to break down the design process in stages and begin by investigating whether further work is necessary at all. After each completed stage, an evaluation should be carried out to check whether the expected effects are worth the cost (Mackenzie, 1984).

4. Objectivity

The design process, according to Mackenzie (1984), has to be objective. According to Mackenzie (1984), it should be desirable to strive for objectivity in the design process, even though this is difficult. It's often difficult to be objective for the members of the client organization because they have formed an idea of how the organization works and how tasks should be implemented in the best way possible. The individual's interests are often in conflict with the interests that benefit the entire organization. Individuals independent of the organization should therefore carry out the design process. It's easier for such individuals to be objective and in addition they can see the big picture of an organization (Mackenzie, 1984).

5. Speed

The design process must be fast. This is because the design problem may change over time. According to Mackenzie (1984), the change applies to quickly develop a design proposal as it can become obsolete if the process takes too long.

6. Fewer Restructuring processes are preferable

If there are two specific options for the organization's design, the one that needs the least personnel and positions restructuring should be used. The number of changes within the organization should be as few as possible. In other words, the fewer the changes, the easier the new organizational design will be implemented. This way of thinking must be used because the goal is that the organization will function as smoothly as possible even during the design change (Mackenzie, 1984).

7. Simplicity

If there are two given options for the organization's design; the simplest one should then be used since complexity can create confusion and conflict. Making use of the KISS (Keep It Simple and Straightforward) policy may increase understanding and acceptance of the new design. According to Mackenzie (1984), a sophisticated design is usually a simple design. Keeping the design simple requires a lot of effort and determination. The trick is to maintain the simplicity while still maintaining the necessary dependencies (Mackenzie, 1984).

8. Accuracy

If there are two given options for the organization's design, the one that is more specific in its design should be used. This is because a new organization design leads to changes where the members within the organization would love to seek clarity. A specific organizational design provides clarity and increases understanding of the new design (Mackenzie, 1984).

9. Carefully drafted

If there are two given pairs of alternatives for the design of the organization, the most elaborated one should be used. By taking into account environmental factors (E), goals (G) and strategies (S), among other factors, a robust organization design is created. The acronym E, G and S depicts organizational logic and according to Mackenzie (1984), it entails the core factors that need to be considered during the design process. A design that takes into account several factors improves scalability and allows the organizational design to respond to change with minimal effort (Mackenzie, 1984).

10. Implementability

If there are two given options for the organization's design, the one that is expected to be the easiest to implement should be used. The organization usually has previous commitments (ownership, political, etc.) that must continue to be taken into account. These commitments must be considered when implementing a new design so it can be implemented effectively. Moreover, if the D1-D5 has been worked through (design process desiderata), the implementation is facilitated even further (Mackenzie, 1984).

11. Easy maintenance and update capabilities

Organizational design should include some sort of encouragement to ensure that maintenance of the design is done. Its management and staff will manage this maintenance (Mackenzie, 1984).

12. Influence, pressure

An organizational design shall serve as a base for a number of ancillary services. If a design for the organization is correctly carried out and implemented correctly, it then creates sub-routines such as personnel placement and payroll system (Mackenzie, 1984).

13. Reduced dependency

From the start to the implementation phase, organizational dependency on the designer should be reduced to the greatest extent possible. After the design is completed, the client or the organization itself should be able to manage it and this is a requirement that must be considered throughout the design process. Mackenzie (1984) desiderata can serve as a principle that the interested parties can follow during the change process. The focus is on the structure and goals, while culture and actors are only treated partially. The Mackenzie desiderata depict a framework approach where adjustments are necessary to fit the organization's aims (Mackenzie, 1984).

Checkland's description of the seven stages of the SSM

Checkland (1995) describes the following seven stages of SSM as follows:

1. Identify the problem situation

Within SSM the problem is not what matters but rather a problem situation that is perceived as problematic by at least one person. This is so since people can be so limited if their focus is

only on a specific problem rather than the entire problem situation which could otherwise include many other problems if examined closely.

2. Express the problem situation

In this step, it is important to identify those various factors within the organization that can be easily changed (processes) and those factors which are more permanent (organizational structure). Furthermore, it is in this phase that it is important to know how the various organizational members perceive the problem situation.

Rich pictures can be used to create a model which makes it easier to think in system terms. The primary aim of using should rich pictures is not to provide a thorough description of the system but rather to provide a picture of how the system can be perceived. Rich pictures should represent the structure, processes and problems in the organization that are relevant to the problem definition. These images will also try to give an impression of the organization's climate. This can be carried out by using three different analyses; First, identify the situations that employees perceive as problematic. Secondly carry out a social analysis in order to identify the different roles within the organization and finally carry out a power analysis.

3. Root definitions.

It is very important to articulate the names of the relevant activity systems right from the beginning so that models can be built based on these names. It is these names that are called root definitions with the aim of expressing the main purpose of the system. Root definitions are normally written as detailed sentences with the help of CATWOE as the starting point. CATWOE stands for Customer, Actor, The transformation process, Weltanschaung (worldview), Owner and Environmental constraints (limitations in the environment). Using CATWOE as a starting point helps in minimizing the risk of the important parts.

4. Conceptual Models

The various root definitions that have been established can form the basis for building conceptual models. There must be 7 +/- 2 activities in each operation system and then performance measures for each operating system should be defined.

5. Comparison of the model with reality

It is essential to make a comparison of the conceptual models that have been built in the fourth stage with the results from stage two of the SSM. Comparisons can be performed in various ways including the use of systems models to start a debate about the changes or to discuss which properties of the conceptual model differ substantially from the current reality.

6, 7. Identify and implement the desired changes

The objective of phases six and seven for both hard and soft systems is the creation and implementation of a system. There are three types of changes that can happen: that is to say, changes in structure, procedures and attitudes. Changes in the first two are easy to specify and relatively easy to implement. However it is very difficult to change people's attitude towards something. It is often recommended in the SSM to temporarily install systems which should perform the work under the supervision of the developer. This is then followed gradually by a transition to the new system.

The main pillars of the SSM approach are learning, culture and participation. It is important to take in and evaluate the entire course of events before deciding how something should be addressed. Learning is something that is constantly evolving. Cultural, organizational and social issues should be given serious consideration in the SSM. Participation of stakeholders is an absolute must in order to achieve successful results.

9.2 Appendix 2

H Simon's GRI Model (1962)

Organizational View I:
S1: Delineate the whole system, (The social system)

Organization

SUPPLIERS

CUSTOMERS
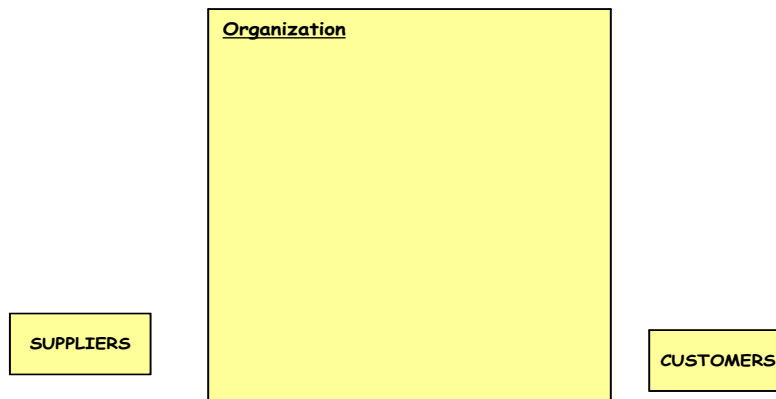
Organizational View II:
S2: Outline a few large parts of the social system

TOP LEADERSHIP

PERSONNEL MANAGEMENT

ECONOMY

PURCHASE MANAGEMENT

MARKETING

SUPPLIERS

CENTRAL INVENTORY

BUTIQUES

CUSTOMERS
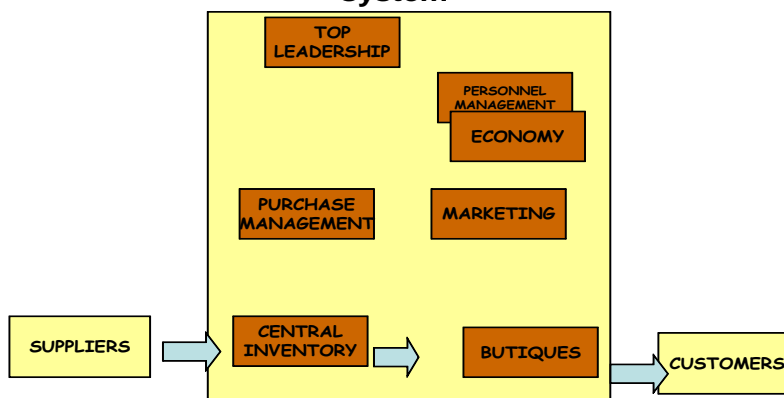
Organizational View III: DECISIONAL AREAS & THEIR INTERACTIONS

TOP LEADERSHIP

HRM

FRM

Expected demands

PURCHASE MANAGEMENT

MARKETING

Purchase order

Order Deliveries

Distribution Plan

Daily Sales

SUPPLIERS

CENTRAL INVENTORY

BUTIQUE A

CUSTOMERS
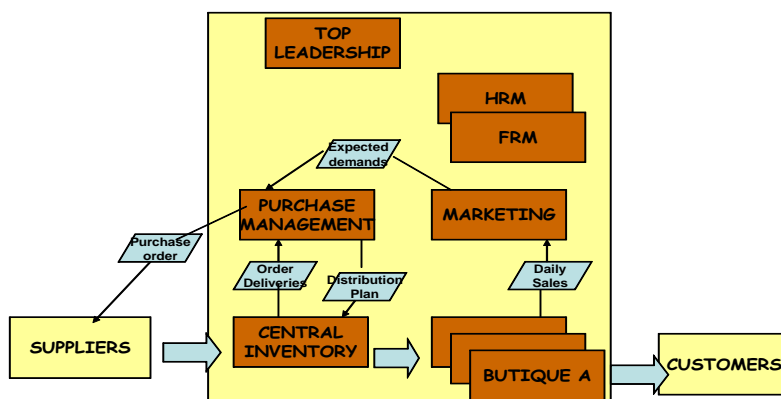
Organizational View IV: INFORMATIONAL AREAS & THEIR INTERACTIONS

Organizations are information systems

Enterprise-Wide Architecture

TOP LEADERSHIP

Policy

HRM

FRM

Policy

Policy

Expected demands

ISP PURCHASE MANAG.

Inv. Saldo

MARKETING

ISM

Purchase order

Order Deliveries

Distribution Plan

Daily Sales

ISS SUPPLIERS

ISI

CENTRAL INVENTORY

ISB

BUTIQUE A

CUSTOMERS
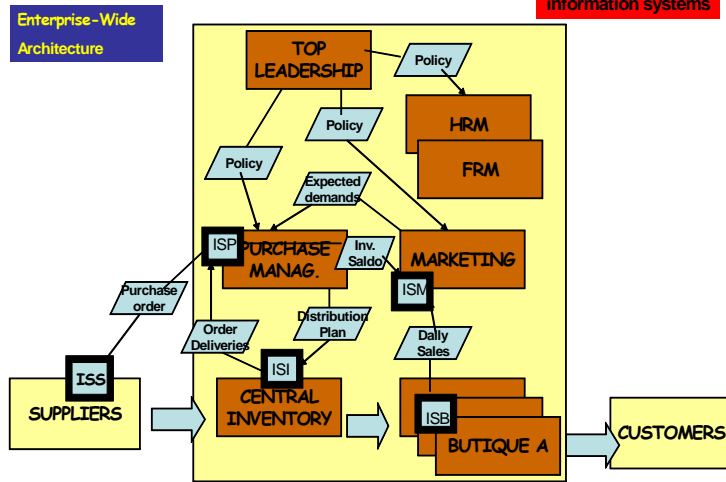
Organizational View V: DATA AREAS & THEIR INTERACTIONS

ISP

Inv. Saldo

ISM

Enterprise-wide "Information Systems Architecture"

"Information Systems Architecture" of Organization

Order Deliveries

Distribution Plan

Daily Sales

Daily Sales

Daily Sales

Purchase order

ISS

ISI

SB1

SB2

SB3
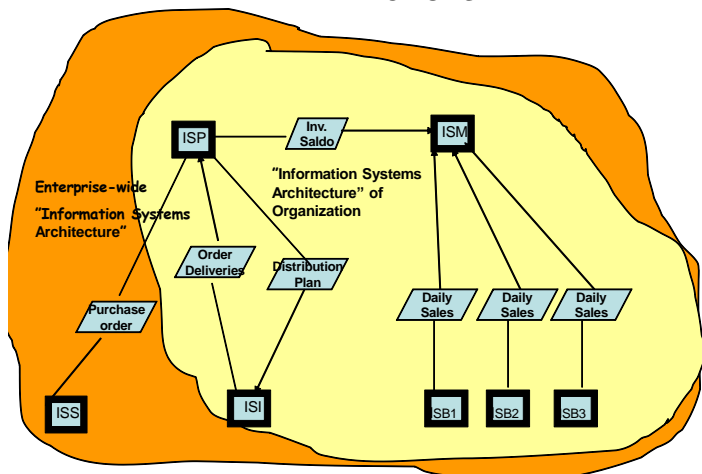
9.3 Appendix 3

Design of Enquiries

4.3.1. Strategic Situation Analysis

R4311. Agreement regarding the process to be followed rather than the result to be achieved

The client organization often has an unclear understanding regarding the whole process of development and its constitutional parts. According to Mackenzie (1984), instead of starting with a conclusion (e.g. "this is the problem, now we will fix it"), the steps involved in the process of enterprise development are discussed and a consensus on how the process should look like is established. However, in the other approaches represented by our model the above requisite is implicitly stated. In any case, the Enterprise Architect is expected to have a clear understanding of the above requisite.

Formulating the query

To what extent does the Enterprise Architect understand the following steps as constitutional parts of the enterprise development process?
Answering the query
- Making a strategic analysis of the current and future environment of the enterprise. In the same sense, the degree of alignment between the expected effects and the real effects are evaluated (see last activity)
- Formulating the mission, vision, values and strategy of the enterprise
- Designing alternative architectures of the enterprise
- Compare current and alternative architectures in order to obtain a strong shared understanding regarding the architectural changes that should be implemented as well as the expected effects that should be generated by these implementations
- Implementing the proposed changes
- Analysing the effects that the implemented changes have generated and deciding on the degree of alignment between the expected effects and the real effects provided by the actions taken.
- Other steps...

Explanation
The above procedure expresses the intentions underlying our graphical PED model. The four approaches that are included and represented by our model reflect just the intentions underlying the requisites for alignment between the stakeholders' expectations and the real response of the implemented changes.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above constitutional parts that belong to the enterprise development process. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4312: Methods for determining and supporting the content of the strategic situation analysis

Formulating the query

To what extent does the Enterprise Architect understand the kind of methods or techniques that are relevant in facilitating the activities of strategic situation analysis?

Answering the query
   a) SWOT

   b) CSF

   c) CATWOE

   d) PEST

   e) Use Case

   f) Other methods…

Explanation

The Enterprise Architect is expected to delineate and focus on the meaningful activities that together provide the subject matter of communication and dialogue between the different stakeholders. For instance, the following three conditions affect or influence the choice of relevant methods:

   1. If the scope of the situation analysis is to cover the internal relationships between the different constitutional parts of the enterprise, then the focus of analysis is established and is better understood with the support of techniques such as CATWOE and CSF.

   2. If the scope of the situation analysis is to address the external relationships between the enterprise and its suppliers and customers as well as competitors, then the focus of analysis is established and is better understood with the support of techniques such as CATWOE, SWOT and CSF.

   3. Lastly, if the scope of the situation analysis should cover the macro-environment and its impact on the future of the enterprise, then the focus of analysis is established and is better understood with the help of techniques like PEST.

The Enterprise Architect is expected to determine the inclusion and the exclusion of the above given list of answers aiming at facilitating the delineation and focus of the situation analysis. During the situation analysis, this judgment is obtained with respect to the scope of analysis covered by a particular method.

Adequacy of methods with respect to the delineation and focus of situation analysis	Internal relationships between the constitutional parts of the enterprise	External relationships between the enterprise and its customers and suppliers	Macro relationships between enterprise and its macro-environment
CATWOE	X	X	
CSF	X	X	
SWOT		X	
PEST			X
USE-Case			
Others			

R4313. Maintaining a continuous dialogue with the stakeholders in order to obtain the required agreement about the approach to be followed

Formulating the query

To what extent does the Enterprise Architect understand the various kinds of models that can facilitate the communication and dialogue with the stakeholders during the developmental process?

Answering the query
- Formal mathematical models, i.e. systems of equations
- Statistical diagrams
- UML-based object models
- Rich pictures
- Metaphors given in natural language
- Other alternatives…

Explanation
According to the four approaches represented by the PED model, it is important to establish and maintain a fruitful two-way communication, i.e. continuous dialogue, with the stakeholders during the situation analysis phase. Such communication is expected to facilitate a smooth establishment of shared awareness, thereby creating an agreement with respect to the various concerns of stakeholders during the situation analysis phase.

Measuring the provided answer:
The Enterprise Architect is expected to determine the inclusion and exclusion of the above given models in the list aiming at facilitating effective communication between the stakeholders during the situation analysis phase. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers: 2, 3, and 4.

R4314: Essential results that must be provided from the strategic situation analysis

Formulating the query
To what extent does the Enterprise Architect understand the kind of results that must be provided during the strategic situation analysis in order to facilitate progress within the next steps of the enterprise development process?

Answering the query
- Models that represent the current situation of the enterprise i.e. internal relationships, external relationships, macro-environmental relationships.

- The experienced real effects of development provided by the enterprise in terms of the performance process as well as stakeholders satisfaction.

- Structural, functional, infological, socio-cultural, etc. cases of misalignment

- The meaning of these conflicts for the existence of the enterprise as well as the frequencies of these conflicts

- Others results…

Explanation

The Enterprise Architect is expected to be able to delineate and focus on the meaningful activities that together provide the subject matter of communication and dialogue between the different stakeholders. For instance, the following three conditions affect or influence the choice of relevant methods.

If the scope of the situation analysis should cover the internal relationships between the different constitutional parts of the enterprise then the focus of analysis is established and is better understood with the support of techniques like CATWOE and CSF.

If the scope of the situation analysis should cover the external relationships between the enterprise and its suppliers and customers as well as competitors, then the focus of analysis is established and is better understood with the supports of techniques such as CATWOE and SWOT.

Lastly, if the scope of the situation analysis should cover the macro-environment its impact on the future of the enterprise, then the focus of analysis is established and become best understood with the supports of techniques like PEST.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and the exclusion of the above conditions given in the list aiming at facilitating the delineation and focus of the situation analysis. This judgment is obtained with respect to the scope of analysis covered by a particular method by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4315: Understanding the role and importance of stakeholders in the situation analysis process

Formulating the query

To what extent does the Enterprise Architect understand the roles played by each of the following categories of stakeholders in relation to the situation analysis process?

Answering the query

- Operations management team
- Operations managers
- Operations personnel/staff
- Customers
- Owners
- Competitors
- CEO (Chief Executive Officer)
- CIO (Chief Information Officer)
- CTO (Chief Technical Officer)
- Current and future partners of the enterprise
- Other groups

Explanation:

Checkland's model (1985) focuses on the cultural part within organizations and advocates structured debate in which all actors in a research project are involved. It's thus very important to recognize who the stakeholders are and which one participates during the strategic situation analysis.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above given stakeholders during the strategic situation analysis phase. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4316. Understanding the role of the Enterprise Architect in the situation analysis process

Formulating the query

To what extent does the Enterprise Architect play the role following roles in the situation analysis process?

Answering the query

- A Teacher
- A Listener
- A Policymaker
- A Mediator/conflict solver
- A "Politicians"/negotiator
- As a change agent
- Enterprise Architect
- Business architect
- IS architect
- Other possible roles

Explanation:

Our focus with this question is to examine the various roles played by an Enterprise Architect during the strategic situation analysis phase.

It is important to understand the specific roles of the Enterprise Architect during this phase since such specific roles need to be tailor-made in order to fit into the current situation, which in turn will facilitate the success of the strategic situation analysis.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above roles played by the Enterprise Architect in the strategic situation analysis. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4

R4317. Representing the holistic perspective in the situation analysis process

Formulating the query

To what extent does the Enterprise Architect understand the following perspective of analysis in the situation analysis?

Answering the query

- Rational
- Socio-Cultural
- Economic
- Structural
- Strategic
- Contextual
- Holistic
- Infological (cognitive)
- Other possible alternatives

Explanation:

In this phase, it is imperative to ensure that the Enterprise Architect uses a holistic perspective during the strategic situation analysis. We seek to find answers to questions concerning the structural, socio-cultural, functional and logical perspectives before proceeding to the next phase within the PED model.

Measuring the provided answer:

The Enterprise Architect is expected to understand the various perspectives of the enterprise that exist during the strategic situation analysis. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

4.3.2. (Re) Formulating the mission, vision and strategy of the enterprise.

The term root architecture defines and has in harmony the following two essential aspects of the enterprise:

I.   A sense of excellence in performance

II.   A strong cohesion amongst the stakeholders despite of their differences in different areas of interests. Smith () demonstrates this with a dependency diagram between the three essential stakeholders of the enterprise. That is to say:

- Owners' satisfaction is dependent on customer response;

- Customer satisfaction is dependent on employee response;

- Employee satisfaction is dependent on owners' response;

In this sense, nothing can be added or removed without creating disharmony (misalignment).

R4321: Understanding why the establishment of a root definition makes sense

Formulating the query

To what extent does the Enterprise Architect understand why the establishment of a root definition makes sense?

Answering the query

- The root architecture is the proper foundation upon which a sound Enterprise Architecture is designed and implemented
- The root architecture is the ground for a sustainable Enterprise Architecture
- The root architecture provides a way for avoiding the penalties of architectures derived from requirements that are sensitive to time.
- The root architecture always provides a sound direction for meaningful enterprise development. Any fundamental change within the root architecture leads to some form of re-orientation
- Other reasons…

Explanation

It's important to highlight the importance of defining root architecture before proceeding with the design stage and before getting the satisfaction of the owner, customer satisfaction and employees' satisfaction.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above given alternatives regarding the reasons for the establishment of the root architecture. This judgment is obtained with respect to the scope of analysis covered by a particular method.

R4322: Understanding the content and form of a root architecture
Formulating the query

To what extent does the Enterprise Architect understand the constituent parts of an enterprise "root architecture"?

Answering the query
- Mission of the enterprise i.e. social responsibility
- Ultimate purpose of the enterprise i.e. reason d'être
- Vision of the enterprise
- Expectations of the stakeholders such as owners
- Core values of the enterprise, i.e. culture, world views, etc.
- Legal and social constraints , e.g. the requisite of sustainability
- Goals and objectives of the enterprise
- Core activities
- Expected behaviour of the enterprise
- Other

Explanation

Checkland (1985) has defined the identity of an enterprise in terms of a so called "root-definition".
The constituent parts of such definition can be given in the following terms:
- Expectations of the stakeholders such as owners, actors, and clients
- Core activities for responding to the above expectations, as well as
- Legal and social constraints, e.g. the requisite of sustainability, requisite of ethicality, etc.

Furthermore the formulation of such root-definition is supported by the technique of CATWOE, i.e. Clients, Actors, Transformation, World views, Owners, and Environment

Root Definition of the enterprise	Clients	Actors	Owners	Environment
World views	Clients' expectations	Actors' expectations	Owners' expectations	Legal , social, ethical etc. constraints that limit the freedom of the enterprise
Transformation	Core activities responding to clients' expectations	Core activities responding to actors' expectations	Core activities responding to owners' expectations	Core activities responding to
Degree of stakeholders	Clients based effectiveness	Actors' based effectiveness	Owners' based effectiveness	Environment's based satisfaction

satisfaction				

The above table is used to demonstrate the constitutional parts of a root definition as well as their corresponding relationships. However, the other approaches have either a limited or a more extended view of such definition. In any case, a root-definition may be seen as the ground of direction for every meaningful effort of the enterprise.

Measuring the provided answer:

The Enterprise Architect is expected to determine the constitutional parts of what can be considered to be meaningful in terms of root architecture.

R4323: Understanding the correct way for establishing a root architecture

Formulating the query

To what extent does the Enterprise Architect understand how root architecture is or should be established?

Answering the query

- By a distinct arrangement of priorities between the expectations of the stakeholders.
- By the power of a dominated coalition over any other stakeholder
- By the professional authority of an Enterprise Architect
- By negotiation between the participating stakeholders
- By the leadership of the enterprise
- By active participation in any decision that belong to the domain of change management
- By consensus of participating stakeholders
- By a meaningful accepted utopia
- Other

Explanation

Knowledge about the constitutional parts of a sound architecture is necessary but otherwise an insufficient precondition for the establishment of root architecture. For instance, according to Hedberg (1980), knowledge alone is not enough in considering the factors that can help in establishing a root definition. For Hedberg (1980), any meaningful change decision is a participative decision that can secure a win/win relationship between the different groups of stakeholders.

Measuring the provided answer:

The Enterprise Architect is expected to determine the constitutional parts of the meaningful root architecture.

R4324: Understanding the criteria underlying the acceptance of a root architecture

Formulating the query

To what extent does the Enterprise Architect understand what kind of criteria that must be satisfied by the root architecture in order to be accepted?

Answering the query

- Rational enterprise performance
- Rational performance and cultural feasibility
- Social symmetry and equity
- By negotiation between the participating stakeholders
- By the leadership of the enterprise
- By a sense of consensus between the participating stakeholders
- By voting between the stakeholders
- Other criteria…

Explanation

If the goal is that the root architecture is going to be accepted by all the stakeholders within the enterprise, is it vital then to be aware of the right criteria to choose.

Measuring the provided answer:

The Enterprise Architect is expected to determine the different criteria for choosing a root definition is order to be accepted by all the stakeholders concerned.

4.3.3. Generic and Explicit Architectural Knowledge

R4331: Understanding the importance of explicit knowledge in the Enterprise Architect's role and responsibilities.

Formulating the query:

To what extent does the Enterprise Architect understand the kind of explicit knowledge that is necessary for his or her role and responsibilities?

Answering the query:

- Applying system thinking in the area of architectural design
- Architectural theories in form of Enterprise Architecture frameworks
- Evaluation theories of design
- Specific approaches to architectural modelling techniques
- Specific theories of functional alignment (Information economics)
- Specific theories of structural alignment (informational politics)
- Specific theories of info-logical alignment (Reach and Richness)
- Specific theories of socio-cultural alignment (win/win)
- Specific theories of contextual alignment (lawful behaviour, etc.)

Explanation:

According to Checkland (), Ackoff () and Churchman (1971), design knowledge is both generic and specific. In the first case, a design can be visualized through different kinds of holistic (total) enterprise models whereas in the second case, we have theories that try to explain the different kinds of alignment that together express a sense of harmony and disharmony respectively.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the kind of generic and explicit knowledge that belong to the enterprise development process. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

4.3.4 Architectural design ((Re)-Designing the Architecture of the Enterprise)

R4341. Essential parts of Enterprise Architecture

Formulating the query:

To what extent does the Enterprise Architect understand the essential parts of the architecture of the enterprise?

Answering the query

- Business processes
- Stakeholders
- Employees
- Managers
- Enterprise purpose
- Structure of authority and responsibilities
- Vision, mission, strategy
- Internal and external context
- Information systems
- Information infrastructure
- Actual requirements for change
- Other essential parts

Explanation

The above procedure expresses the intentions underlying our graphical PED model. The four approaches that are included and represented by our model reflect the essential parts of the architecture of the enterprise. Therefore, the Enterprise Architect is expected to understand the essential parts of the architecture of the enterprise.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above constitutional parts that belong to the enterprise development process. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4342. Essential relationships that belong to the Enterprise Architecture

Formulating the query:

To what extent does the Enterprise Architect understand the relationship that exists between the information system of the enterprise and the essential parts of the architecture of the enterprise?

Answering the query

- Functional relationships
- Business process-oriented relationships
- Service-oriented relationships
- Structural relationships
- Infological relationships
- Cognitive relationships
- Decisional relationships
- Contextual relationships
- Socio-cultural relationships
- Purposeful relationships
- Other relationships…

Explanation:

From the change management perspective, the dimensions represented in the FEM (Framework for understanding Enterprise Morphology) model forwarded by Svärdström et al. (2006) comprise of stakeholders, organizational structure, business processes, organizational culture and goals, and their relationships with the information systems architecture (See Figure 8). The preceding dimensions of the FEM model connect to the information systems architecture through the info-logical, socio-structural, functional, and social cultural relationships respectively. Hence, the Enterprise Architect is expected to have a proper understanding of the various relationships that exist between the information system of the enterprise and the vital parts of the architecture of the enterprise.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above relationship that exists between the information system of the enterprise and the essential parts of the architecture of the enterprise that belong to the enterprise development process. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4343. Forms of interoperability involved in the Enterprise Architecture

Formulating the query:

To what extent does the Enterprise Architect understand the forms of interoperability that belong to the architecture of the enterprise?

Answering the query

- Unification
- Collaboration
- Replication
- Standardization
- Coordination
- Cooperation
- Information-based integration
- Inter-sharing
- Inter-linking
- Information-based differentiation.
- Other

Explanation:

According to Bredemeyer (2002), the objectives of the Enterprise Architect in this phase is to create an architecture that is good and well documented. Therefore, it's important for the Enterprise Architect to be in a position where he/she understands the forms of interoperability that belong to the architecture of enterprise.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above forms of interoperability that belong to the architecture of the enterprise. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4344: Understanding the role and importance of stakeholders into the architecture stage

Formulating the query:

To what extent are the following stakeholder groups actively involved in architectural design?

Answering the query:

- Operations management team
- Operations managers
- Operating personnel/staff
- Customers
- Shareholders
- Competitors
- Consultants
- Current and future partners
- Suppliers
- Other groups

Explanation:

Checkland's model (1985) focuses on the cultural part within organizations and advocates for a structured debate in which all actors in a research project are involved. It's thus very important to recognize who the stakeholders are and which one participates in the architecture design.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above given stakeholders during architecture design stage. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4345: Understanding the criteria of determining the value of the future architecture.

Formulating the query:

To what extent are the following terms of the future architecture model valued in terms of attractiveness?

Answering the query:

- Transparency (e.g. clear responsibilities)
- Awareness (e.g. taking into account all operational parts)
- Meaningfulness (the model's relevance for future activities)
- Efficiency
- Productivity
- Excellence (among the best)
- The most unique
- Flexibility
- Realizability
- Other possible answers…

Explanation:

Mackenzie (1984) suggests that the requirements described for designing an organization fall into three broad categories:

- Desiderata the design process (1-5)
- Desiderata of the resulting design (6-9)
- Desiderata for implementing (10-13)

Some of these requirements refer to how we design a properly and attractive architecture.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above terms when valuing the attractiveness of the designed architecture in the architectural design phase. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4346: Understanding the role of the Enterprise Architect in the architecture design.

Formulating the query:

To what extent does the Enterprise Architect play the following roles during architectural design?

Answering the query:

- Teacher
- Listener
- Creator / Architect
- Policymaker
- Mediator / conflict solvers
- "Politician" / negotiator
- Other roles

Explanation:

Our focus with this question is to examine the various roles played by an Enterprise Architect during the architecture design phase.

It is important to understand the specific roles of the Enterprise Architect during this phase since such specific roles need to be tailor-made in order to fit into the current situation, which in turn will facilitate the success of the architecture design process.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above roles played by the Enterprise Architect in the architectural design phase. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4347: Understanding the type of decision taken in the architectural stage.

Formulating the query:

To what extent are the following kinds of decisions made in the architectural design phase?

Answering the query:

- Rational
- Socio-cultural (decisions affecting such individual's work environment)
- Policy
- Economic
- Structural
- Strategic
- Other

Explanation:

It is vitally important for the Enterprise Architect to be conversant with the various kinds of decisions which are normally made during the architectural design phase.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above given decisions made during the architecture design stage. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4348: Understanding the outcome of the architectural design phase

Formulating the query:

To what extent can the following options be the result of the architectural design?

Answering the query:

- A root definition (goal setting)
- Activity Model (As is)
- Activity Model (As Could be)
- Activity Model (As Can Be)
- Activity Model (As Became)
- Action plan
- Resource Allocation
- Other options…

Explanation:

We already know that in the architecture design stage, the input is an architecture concept (root definition), and is the basis for creating a new/alternative architecture model(s). Therefore, it's important to know what kind of output should be generated from the architecture design which, in essence, is a new/alternative architecture model according to Checkland (1985), Mackenzie (1984) and Hedberg (1980).

All the models described in the theoretical grounds refer to the architecture design stage and we are taking them up in this question to see to what extent they are represented.

Measuring the answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above given possible outcomes of the architecture design stage. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4349. Kinds of knowledge used by architects in designing and redesigning the architecture of the enterprise

Formulating the query:

To what extent do the provided knowledge / information belong to the following categories of knowledge?

Answering the query:

a) Objective knowledge
b) Subjective knowledge /intuitive knowledge
c) Inter-subjective knowledge
d) Time-dependent knowledge
e) Time-independent knowledge
f) Proactive knowledge
g) Reactive knowledge
h) Other kinds of knowledge…

Explanation:

One of the approaches that form the basis for our investigation follows a so-called hard design philosophy and uses three kinds of knowledge. However, the rest of the approaches presuppose the use of the whole list of knowledge. Thus, meaningful architecture (any form of good design) is one that uses both the hard and the socio cultural philosophy of design, i.e. soft philosophy.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above categories of knowledge used by him/her during the architecture design stage. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R434.10: The knowledge base of architectural design

Formulating the query:

To what extent are the following kinds of knowledge employed by the Enterprise Architect in order to design a holistic and meaningful Enterprise Architecture?

Answering the query:

- Knowledge regarding the existing and coming IT technologies.
- Knowledge dealing with human nature
- Knowledge about organizational design
- Knowledge about sources as well as principles for balance of power
- Knowledge about the design and function of reward systems
- Knowledge concerning the value system of an organization
- Other kinds of knowledge…

Explanation:

The Enterprise Architect is expected to effectively apply various kinds of knowledge in order to design a holistic and meaningful Enterprise Architecture. In essence, the Enterprise Architecture should have a reliable knowledge base of architectural design in order to create a sound architectural design for the enterprise. Furthermore, the Enterprise Architect should have the ability to articulate and develop holistic and distinct views of the various functions that exist within the enterprise, their related dependencies and operating environments.

Measurement of the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above forms of knowledge that he/she can use in order to design a holistic and meaningful Enterprise Architecture. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R434.11: Kinds of properties that determine a sound Enterprise Architecture

Formulating the query:

To what extent does the architect use the following essential properties in order to provide sound Enterprise Architecture?

Answering the query:

- Transparency (e.g. clear responsibilities)
- Awareness (e.g. taking into account all operational parts)
- Meaningfulness (the model's relevance for future activities)
- Efficiency
- Productivity
- Excellence (among the best)
- The most unique
- Flexibility
- Realizability
- Other essential properties…

Explanation:

Going back to Mackenzie (1984), we said before that he suggests that the requirements described for designing an organization fall into three broad categories:

- Desiderata the design process (1-5)
- Desiderata of the resulting design (6-9)
- Desiderata for implementing (10-13)

Some of these requirements refer to how we design a sound architecture

Measuring the answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above essential properties in order to provide sound Enterprise Architecture. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R434.12: Understanding the various categories of knowledge that the Enterprise Architect uses in the architectural design phase.

Formulating the query:

To what extent does the Enterprise Architect utilize the following categories of knowledge?

Answering the query:

    a) Technological
    b) Cognitive
    c) Organizational
    d) Political
    e) Reward
    f) Cultural
    g) Other…

Explanation:

One of the approaches that form the base of our investigation follows a so-called hard design philosophy and uses just the three first kinds of knowledge. However the rest of the approaches presuppose the use of the whole list of knowledge. Thus, meaningful architecture (any form of good design) is one that uses both the hard and the socio cultural philosophy of design, i.e. soft philosophy.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above categories of knowledge that belong to the architectural design stage. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

4.3.5. Change Management

R4351: Understanding the importance and participation of stakeholders in the change management.

Formulating the query:

To what extent are the following categories of stakeholders involved and participate in change management?

Answering the query:

a) Leadership
b) Customers
c) Employees
d) Local or Government authorities
e) Global authorities
f) Local society
g) Others…

Explanation:

Stakeholders' involvement during the change management phase is extremely essential because it will determine the success or failure of the change endeavours within the enterprise. Lack of stakeholders' involvement in the change management process can thwart the progress of the proactive enterprise development process.

Checkland's model (1985) focuses on the cultural part within organizations and advocates structured debate in which all actors in a research project are involved. It's thus very important to recognize who the stakeholders are and which one participates in the change management. In case they don't come to an agreement, it's necessary then to go back to the architecture design stage. That's how important stakeholders are.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above stakeholders that participate during the change management. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4352: Understanding the role of the Enterprise Architect during the change management process.

Formulating the query

To what extent does the Enterprise Architect fulfil the following roles during the change management stage?

Answering the query

- As a teacher
- As a listener
- As a policymaker
- As a mediator/conflict solver
- As a "Politician"/negotiator
- Other roles…

Explanation:

Our focus with this question is to examine the various roles played by an Enterprise Architect during the change management phase.

It is important to understand the specific roles of the Enterprise Architect during this phase since such specific roles need to be tailor-made in order to fit into the current situation which in turn will facilitate the success of the change management process.

Measuring the provided answer:

The Enterprise Architect is expected to determine his role during the change management. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4353: Representing the holistic perspective in the change management stage.

Formulating the query

To what extent are the following decisions essential in the change management phase?

Answering the query

- Rational
- Socio-cultural
- Policy
- Economic
- Structural
- Strategic

Explanation:

In this phase, it is vitally important for the Enterprise Architect to develop a holistic perspective which entails the various kinds of decisions that will enhance progress of change during the change management phase. Hence, we seek to find answers to questions concerning the structural, socio-cultural, functional and logical information quality.

Measuring the provided answer:

The Enterprise Architect is expected to determine the essential decisions that should be made during the change management. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4354: Understanding the output of the change management stage

Formulating the query

To what extent does the Enterprise Architect consider the result of the change management as?

Answering the query

- Likely root definition (goal setting)
- Activity Model (As is)
- Activity Model (As it Could be)
- Activity Model (As it Can Be)
- Action Plan
- Resource Allocation
- Other alternatives…

Explanation:

Our focus with this question is to examine the output of this stage to better understand the role of the Enterprise Architect during the change management phase.

Measuring the provided answer:

The Enterprise Architect is expected to determine the various kinds of output at this stage. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the numbers 2, 3, and 4 expresses the degree of belonging.

R4355. Understanding the nature of (enterprise) alignment from a holistic perspective

Formulating the query:

To what extent does the enterprise understand and evaluate the Enterprise Architecture from a holistic perspective (stakeholders' expectations or requirements through the contribution of the enterprise as a whole)?

Answering the query:

- Rational alignment
- Rational desirability and cultural feasibility
- Social (direct and indirect stakeholders) satisfaction (win/win)
- Employees' satisfaction
- Customer satisfaction
- Shareholders' satisfaction
- Community satisfaction
- Partner satisfaction
- Competitor satisfaction
- Sustainable satisfaction (long-term)
- Other forms…

Explanation:

In this phase, the Enterprise Architect is expected to have a holistic perspective of the enterprise in order to understand the nature of alignment that exists within the enterprise. Furthermore, the Enterprise Architect needs to grasp the different forms of satisfaction in relation to the various forms of alignments that exist within the enterprise. In addition, we seek to find answers to questions concerning the structural, socio-cultural, functional and logical information quality.

Measuring the provided answer:

The Enterprise Architect is expected to determine the essential decisions during the change management. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers 2, 3, and 4.

R4356. Maintaining a continuous dialogue with the stakeholders in order to obtain the required agreement about the approach to be followed:

Formulating the query:

To what extent does the Enterprise Architect understand the kind of models that are relevant in facilitating the communication and dialogues between the stakeholders during the development process?

Answering the query:

- Formal mathematical models, i.e. systems of equations
- Statistical diagrams
- Object models based on UML diagrams
- Rich pictures based on CATWOE techniques
- Metaphors given in natural language or visual language
- SWOT model
- PEST model
- Seminars/workshops
- Formal meetings
- Informal meetings
- Telephone contact

Explanation

According to the four approaches represented by the PED model, it is important to establish and maintain a fruitful two-way communication, i.e. continuous dialogue, with the stakeholders during the situation analysis phase. Such communication is expected to facilitate a smooth establishment of shared awareness, thereby creating an agreement with respect to the various concerns of stakeholders during the situation analysis phase. Moreover, such dialogue should also be emphasized even in all the other phases of the PED model where the stakeholders are involved.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the above given models in the list aiming at facilitating effective communication between the stakeholders during the situation analysis phase. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers: 2, 3, and 4.

R4357. Understanding the criteria that can ensure change acceptance and success in the change management process

Formulating the query:

To what extent does an Enterprise Architect consider that the following criteria can secure change acceptance and success in the change management process?

Answering the query

- Systemic sustainability (profitability requirements)
- Cultural sustainability (the change is not contrary to the company's culture, values, etc.)
- Social sustainability (the change is not contrary to the company's social relationships)
- Transparency (the change does not involve unclear responsibilities)
- Awareness (that change will not ignore any of the business parts)
- Holistic attractiveness (meaningfulness)

Explanation:

Hedberg (1980) puts emphasis on the importance of taking all perspectives and knowledge (people, technology, power, organizations, rewards, and values) into consideration in order to ensure sound decision-making. Many political factors need to be taken into account, for example labour unions and owner relations, among others.

In the change management stage, appropriate changes are identified as the definition of feasible and desirable changes are addressed within a given new problem situation and it is important to decide how these changes will be implemented.

Measuring the provided answer:

The Enterprise Architect is expected to determine the inclusion and exclusion of the criteria that can secure change acceptance and success in the change management process. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the degree of belonging is expressed by the numbers: 2, 3, and 4.

4.3.6. Enterprise Architecture implementation

R4361: Understanding the factors behind a successfully implementation of the designed architecture

Formulating the query

To what extent does the Enterprise Architect understand the critical factors related to a successful implementation?

Answering the query

- Implementability
- Ensuring maintenance of the organizational design
- Influence, pressure. If a design for the organization is correctly carried out and implemented correctly, it then creates sub-routines for example, personnel placement and payroll system.
- Ensuring reduced dependency on the designer.
- Other

Explanation:

These critical factors, according to Mackenzie (1984), are important during the implementation stage and it's important to ensure that the Enterprise Architect is aware of such critical factors in order to successfully implement the changes or the new designed architecture.

Measuring the provided answer

The Enterprise Architect is expected to determine the critical factors for succeeding in the change management stage. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the numbers 2, 3, and 4 expresses the degree of belonging.

R4362: Understanding the role of the Enterprise Architect at the implementation stage.

Formulating the query

To what extent does the Enterprise Architect understand his/her role in the implementation stage?

Answering the query

- Teacher
- Listener
- Creator / Architect
- Policymaker
- Mediator / conflict solvers
- "Politician" / negotiator
- Other roles…

Explanation: Our focus with this question is to examine the various roles played by an Enterprise Architect during the implementation phase.

It is important to understand the specific roles of the Enterprise Architect during this phase since such roles need to be tailor-made in order to fit into the current situation, which in turn will facilitate the success of the implementation process.

Measuring the provided answer

The Enterprise Architect is expected to determine his/her role during the implementation phase. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the numbers 2, 3, and 4 expresses the degree of belonging.

4.3.7. Other Characteristics of Enterprise Architect

R4371. Tasks and responsibilities

Formulating the query:

To what extent do the following tasks and responsibilities define the role of the Enterprise Architect?

Answering the query:

- Assist in developing and maintaining strategies that result in efficient and effective use of enterprise core services.
- Strong conceptual and analytical skills.
- Experience in creating and defining new technology concepts and solutions.
- Java development experience preferably in an SAP Enterprise Portal environment.
- Experience in development of Segment Architectures that align with and enable agency strategic goals and business requirements.
- Other alternatives…

Explanation:

Our focus with this question is to examine the various tasks and responsibilities played by an Enterprise Architect.

It is important to understand the tasks and responsibilities of the Enterprise Architect during all the phases of the proactive enterprise development process since such roles need to be tailor-made in order to fit into the current situation in order to minimize failure during the proactive enterprise development endeavours.

Measuring the provided answer

The Enterprise Architect is expected to determine the various tasks and responsibilities that he/she is supposed to carry out. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the numbers 2, 3, and 4 expresses the degree of belonging.

R4372. Roles

Formulating the query:

To what extent does the role of an Enterprise Architect overlap with the following roles?

Answering the query:

- Business architect
- Information architect
- Process architects
- IT architects
- Software architects
- Application architects
- Other alternatives

Explanation: Our focus with this question is to examine the extent to which the role of an Enterprise Architect overlaps with the roles written above. It is important to understand these roles of the Enterprise Architect.

Measuring the provided answer

The Enterprise Architect is expected to understand the extent to which his/her roles overlap with the roles written above. This judgment is obtained by giving 5 points in the case of inclusion and 0 points in the case of exclusion. Lastly, the numbers 2, 3, and 4 expresses the degree of belonging.

R4363: CSF to Success

What are the critical success factors which can help the architect to succeed?

R4364: Factors underlying failures

In your own opinion, what factors explain the future of an Enterprise Architect?