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ICT in Business

ASSESSING THE DECISIONS MADE
PRIOR TO THE USE OF ENTERPRISE
ARCHITECTURE AS A MEANS TO
GOVERN IT PROJECTS

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MASTER'S THESIS

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Master Thesis

M.Sc. ICT in Business

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Abstract

This research investigates decision-making with regard to the use of enterprise architecture (EA) as a means to govern IT projects. However, practical evidence on decision-making with regard to the use of EA in the context of this research does not exist. The EA compliance review process provides insight in how to govern IT projects by means of EA in order to ensure compliance. Within this process EA is used as a means to govern IT projects. The various techniques and resources such as the project start architecture (PSA), an architecture board, compliancy checks, assigning controlling architects and so on, can be found within this process. These techniques and resources are used to ensure compliance with the EA during the execution of an IT project. However, less is known about the decision-making process up front and why, when and how IT projects must be governed by means of EA.

Several studies demonstrate the value of the use of EA as a means to govern IT projects in order to implement certain changes in compliance with the EA. With this in mind, one could argue that organizations should always use EA to guide and constrain all IT projects. However, applying all resources and techniques with regard to EA, comes at the cost. Therefore there must be some sort of trade off decision-making process that determines whether the benefits outweigh the costs in a particular situation. It could be argued that applying EA at smaller-scale projects results in extra ballast, not only for the budget of the project. Therefore this research investigates the possibility for a cost efficient and effective decision-making model for the use of specific means with regard to EA.

A literature study was conducted to gain insight on the various topics covered within this research. Because the literature did not provide adequate answers for this research, field research was needed to gather enough data in practice. Interviews were used as a data collection method. Eventually twenty-five interviews were held within twenty-two organizations covering the public-, semi-public- and private sector. These interviews were recorded, transcribed and coded, in order to analyze the data by means of root-cause visualization.

The literature study concluded that there is a choice not to develop certain IT projects in compliance with the EA, as captured within the DYA model. This decision implicates that certain IT projects do not need to be governed by means of EA or need not comply. In practice it became clear that this decision is based on the criteria time constraints, insufficiency of the EA and temporary solutions. Furthermore it became clear that this decision is not taken very frequently, if ever taken at all. The vast majority of the IT projects is developed in compliance with the EA and therefore is initiated and planned in conjunction with the EA as a general rule. It is within this initiation and planning process that a second decision is taken. Under the general rule organizations make a decision on the degree of appliance of EA means that are needed in order to provide guidance and govern a particular IT project. It became clear that organizations do not consider whether the use of EA actually outweigh the costs, at least not consciously. Instead organizations take a decision in which the resources and techniques are weighed against the desired amount of control. This decision is taken based on an implicit risk and impact analysis, which is based on multiple criteria. This implicit analysis and its criteria are made explicit by the development of a multi criteria model, based on which resources and techniques can be allocated.

Keywords. Enterprise Architecture, Prescriptive framework, IT projects, Compliance, Decision Making, Resources and techniques

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1. Introduction

1.1 Context

This study has the aim to gain knowledge about the decision making process with regard to compliance of IT projects to Enterprise Architecture (EA). More specific to assess the criteria that guide the decision whether or not an IT project has to be governed by means of EA. Although EA is a relatively young research area, over the last few decades more and more research is initiated to elucidate the discipline of EA. The existing literature mainly focuses on the development of EA frameworks and the EA practice, the instrumental view. Over the last decade a significant increase in EA frameworks and models is clearly noticeable. The same phenomenon is noticeable with regard to the EA practice. This set of activities, responsibilities and stakeholders involved in the development and application of EA has become an important research area. Especially the interest in the application of EA increases, as (Foorthuis R. S., 2010) argues, "to be able to reap its benefits, it is important that an EA is actually complied with" (Boh, 2007) (Foorthuis R. B., 2008).

EA and project compliance is often referred to as the prescriptive side of EA. (Foorthuis R. B., 2008) (Foorthuis R. H., 2009) investigates how IT or business projects can comply with the EA as a prescriptive framework that guides and constrains subsequent development of IT projects (Foorthuis R. S., 2010), investigates which techniques are used in practice to stimulate conformance to the EA and which benefits are actually gained. (Steenbergen, 2011), researches the effectiveness of EA usage within projects and tries to link the effectiveness to the maturity of applying EA. It seems that the incentives such as "improve project success, to reduce project risk, duration and complexity, to speed up the initialization of a project and to reduce project costs and risks" could be drivers to govern IT project by means of EA. However in assessing when using EA as a means to govern IT project, not only the incentives of working in accordance to the EA need to be considered but also the drawbacks and investments. After all, allocating more resources to an IT projects such as a controlling architect will increase the development costs. Moreover too much compliance checks will increase the duration of the project instead of decreasing it.

For the purpose of this research EA is a set of principles or guidelines to govern new projects with the purpose of keeping them aligned with the organizations strategic goals. This often referred to as the prescriptive side of EA that guides and constraints the subsequent development of IT project in order to establish compliance with the to-be situation of the EA. Compliance with the EA is not a goal in itself. A project has to be carried out in compliance in order to implement certain changes in the desired strategic direction. The degree of compliance can be derived from the extent to which a project fulfils the desired outcome as established in the to-be situation of the EA. Thereby, EA can be used as an instrument to govern IT projects, in the same way as PRINCE2 is an instrument to govern or manage the various stages and sub-processes of an IT project.

This research investigates the possibility for a cost efficient and effective decision-making model with regard to the use of specific means and resources with regard to EA. For instance, it might be possible that the complexity or impact level of a specific project or the number of available architect's influences the decision whether or not to allocate specific resources to ensure the compliance of the IT project to the EA. In order to touch upon the subject of decision-making with regard to EA compliance, the concepts of EA, initiating IT projects- and executing IT projects in compliance with EA will be studied.

The qualitative research will be focused on organizations, which use their EA as a prescriptive framework to govern the artefacts delivered by IT projects. Assuming that organizations that apply EA as a prescriptive framework do not actually govern all IT projects by means of EA, because it comes at a cost. Research is needed to examine the reasons that could or could not lead to applying EA for a project. By reviewing the reasons or criteria for making the decision whether to execute a project in accordance with the EA, insight can be obtained under what circumstances an organization should carry out IT projects in compliance to the EA or not. This enables organizations to exploit the benefits of conformance, only for those projects for which it pays off.

1.2 Problem statement

Existing literature provides a theoretical insight on the subject of EA compliance. Its main focus is on the use of particular frameworks, models and methods to guide and constrain IT projects in comparison to the achieved benefits. However actual practical evidence on decision-making process with regard to the use of EA as a means to govern IT projects, does not exist. Although the existing literature provides enough models, methods and theories, CIO's and architects indicated that there is room for improvement in using EA as a means to govern IT projects (NAF, 2012). This indicates that there is still the need for tangible practices with regard to applying EA as a means to govern IT projects.

The EA compliance review process provides insight into how to govern IT projects by means of EA in order to ensure compliance. Here EA is used as a means to govern IT projects. The various techniques and resources such as the need for project start architecture (PSA), an architecture board, compliancy checks, assigning a project architect and so on, can be found within this process. These techniques and resources are used to ensure compliance during the execution of an IT project. However, less is known about the decision-making process up front and why, when and how IT projects must be governed by means of EA. Moreover, research with regard to the use of EA within the initiation and planning phases of an IT project does not exist.

Several studies demonstrate the value of the Enterprise Architecture development and ensuring compliance within IT projects, while executing IT projects. Benefits of EA compliance are said to be to improve project success, to reduce project risks, to reduce the duration and complexity of a project. With this in mind, one could argue that organizations should always use EA to guide and constrain all IT projects. However, applying EA comes at the cost and therefore there must be some sort of trade off decision-making process that determines whether the benefits outweigh the costs in a particular situation.

The assumption that organizations do not govern all of their IT projects by means of EA, raises the questions: How do organizations determine whether a project needs to be governed by means of EA and on which criteria is this decision based? Moreover is this a well-considered decision per project or are all projects governed by the same amount of means with regard to EA?

1.3 Contribution

EA is an emerging field of interest within scientific research. Nevertheless, research on this topic is increasing in amount the last couple of years. The latest studies performed on the topic of EA give a good overview of the usage of EA, its contribution and the benefits. Researches with regard to discovering the added value of projects that adhere to the EA are examples of recently conducted studies. However, none of them investigates when and why organizations decide to apply EA, or not. This calls for research to investigate the use of EA in more depth. By researching the decision-making process with regard to EA, IT projects and compliance, this research has the aim to reveal new scientific knowledge and practices.

Where the existing literature primarily answers the question how to apply EA when carrying out an IT project and how this relates to the possible benefits, this research has the aim to elucidate when and why EA is used within the phases of initiation and planning of an IT project. This research focuses on investigating how EA is applied within these stages and when this leads to the decision to carry out an IT project governed by means of EA. By determining whether there is a trade off within the decision making process that determines whether the benefits outweigh the costs in a particular situation, organizations could make a well-informed decision to carry out an IT project governed by means of EA, or not.

The relevance of this research is to gain knowledge on the decisions that are made with regard to EA compliance within the initiation and planning phase of an IT project. The added value of this research is to deliver and share knowledge on how the decisions with regard to EA compliance are made. Assessing and evaluating all projects on their compliance can be time consuming and costly. Based on this research organizations could make a cost-efficient and effective decisions on whether or not an IT project needs to be carried out in compliance with the existing EA. Therefore this research can be seen as a scientific contribution towards a relatively young and emerging field of research.

1.4 Research questions

To answer the problem statement about the decision whether a project needs to be governed by means of EA, the main research question is divided in several research questions to gain knowledge about the use of EA. In practice organizations commonly use EA as a set of principles or guidelines to govern new projects with the purpose of keeping them aligned with the organizations strategic goals. By using EA as a means to govern IT projects, the organizations have to allocate resources such as architects and project architects who are responsible for ensuring compliance with the EA. However, this comes at a cost and organizations need to make a well-considered decision based on a trade off of the costs versus the benefits. This results in the following research question and sub questions:

> ▪ MQ: How do organizations decide whether or not an IT project needs to be governed by means of Enterprise Architecture?

Figure 1: Main question

The following sub questions are established in order to answer the main question and to investigate the possible relationships.

> ▪ RQ1: What drives or prevents organizations to govern IT projects by means of Enterprise Architecture, and do these criteria influence decision-making?
>
> ▪ RQ2: Which processes are needed for initiating and planning IT projects in conjunction with the Enterprise Architecture and where in these processes is decided whether or not an IT project needs to be governed by means of Enterprise Architecture?
>
> ▪ RQ3: Which criteria, reasons and techniques are used by organisations to assess and decide whether or not an IT project needs to be governed by means of Enterprise Architecture?
>
> ▪ RQ4: Do these criteria affect the allocation of specific techniques and resources to IT projects, when the organization decides to govern an IT project by means of Enterprise Architecture?
>
> ▪ RQ5: Is there a possibility to develop a model that contributes to the decision whether or not IT projects have to be governed by means of Enterprise Architecture?

Figure 2: Research questions

1.5 Methodology

1.5.1 Research design

This section will further describe the research approach used for this master thesis. This empirical research is based on an explorative approach in which various research methods are used. The existing literature needs to provide a theoretical insight on the subject of EA compliance. However less is known about when a particular IT projects needs to be governed by means of EA. Where (Ghauri, 2005) argues, "When the research problem is badly understood, a (more or less) exploratory research design is adequate." This type of research is also known as formulative research as (Jarvinen, 2004) states, "the goal of formulative research (also called exploratory research) is to identify problems for more precise investigation, as well as to gain insights and to increase familiarity with the problem area." In this case this research will be used to gain insights and to increase familiarity with the problem area.

This approach is chosen, because the decision-making process with regard to EA as a means to govern IT projects is a subject that has not been clarified in earlier research. Within a preliminary literature study no clear evidence was found to determine the criteria to decide whether or not an IT project needs to be governed by means of EA. Nevertheless this preliminary research provided insight on this decision as the DYA model provided by (Berg M. S., 2004), which implicates that there actually is a decision to "develop with or without the usage of architecture." This model implicates that this decision is made within the process of the strategic dialogue. However this concept remains rather vague and therefore an explorative research method is best suited to provide insights and to increase familiarity with this concept.
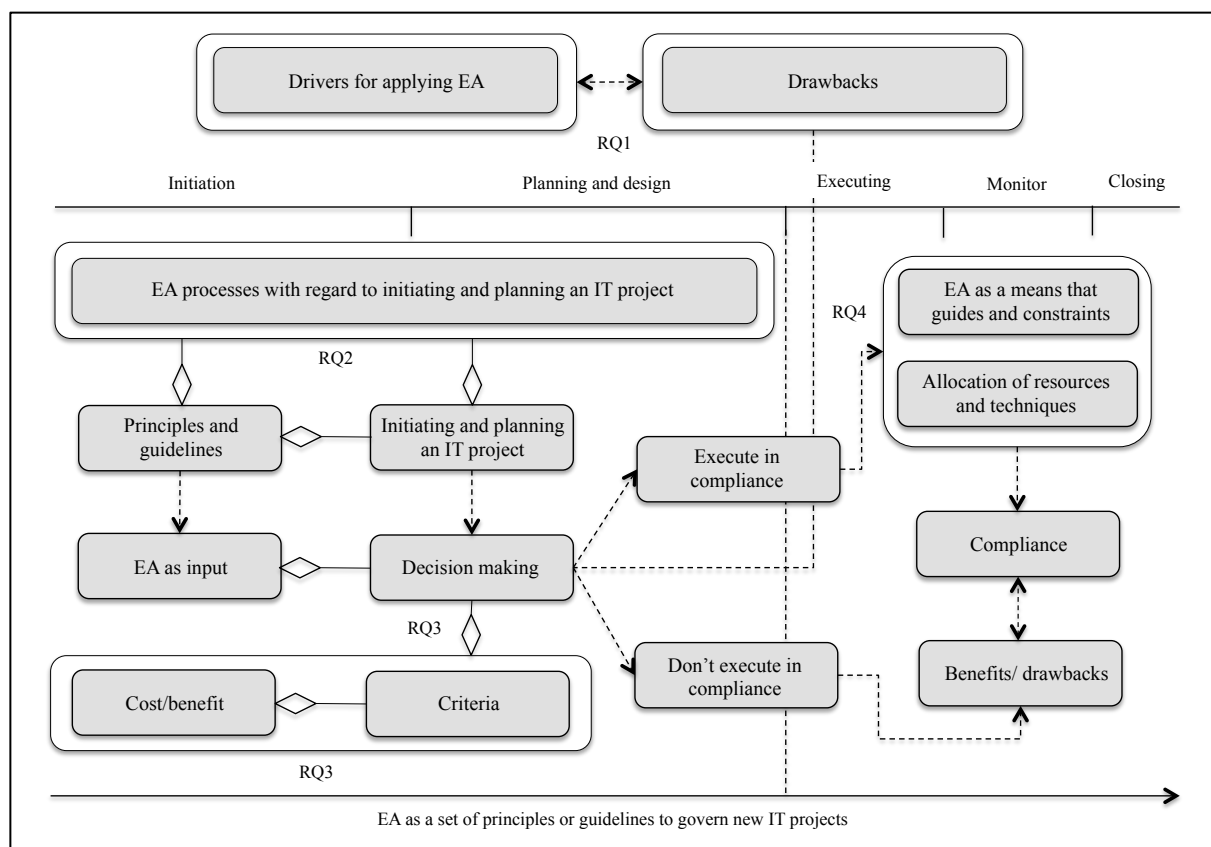
Figure 3: Research model

This research model as can be seen in figure 3 is based on the preliminary study that was conducted. The research model is used as a guideline and most of all as a delimitation to determine the scope of this research. The preliminary study was used to develop the research model, this model will be used to identify important variables and test the relationships between them.

1.5.2 Research methods

Throughout the use of several research methods the research model will be investigated to be able to elaborate more on the variables en their relationship. Figure 4 provides an overview of the techniques that were used during this research.
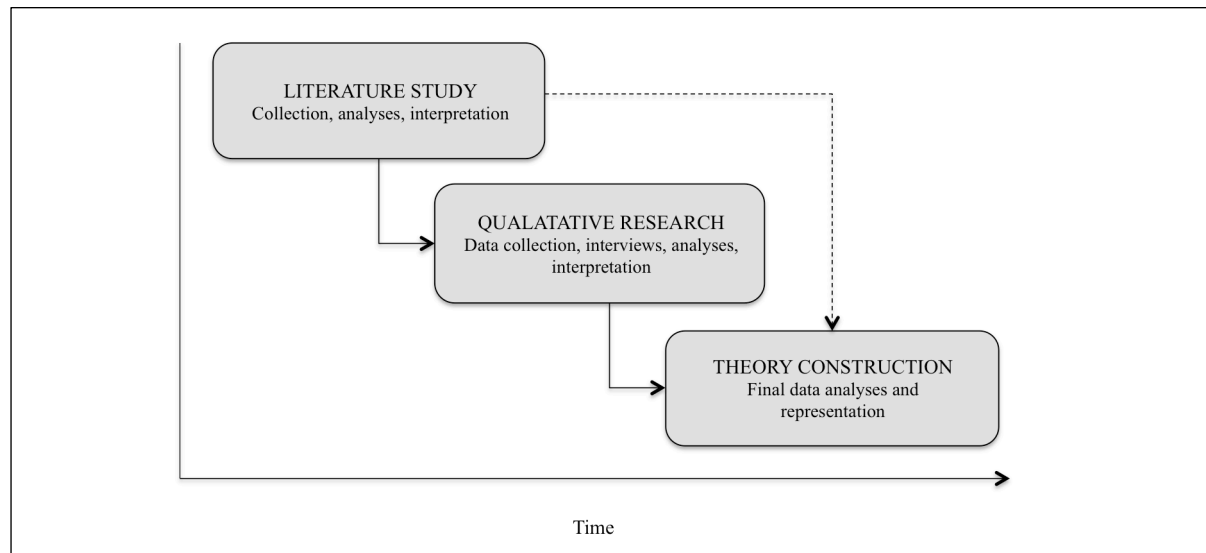
Figure 4: Research method

The next paragraphs will describe the methods that are used in order to investigate the research question and the variables visualized in the research model.

A literature study needs to be conducted to gain insight on the various topics covered within this research. Insight within the various topics is needed to form a vision of the various topics that relate to this research. Besides forming a vision, the literature study is used to search for more detailed evidence on the research topic and the related subjects.

For the literature study several libraries are used in order to find articles and books that cover the topics of Enterprise Architecture, governance, IT projects and compliance. Within this study these aspects are assessed on a possible relationship. These topics will be described based on their meaning, interrelation and contribution to the research topic. The sources that are used for this search were:

- IEEE Digital Library Computer Science
- University of Leiden Digital Library
- Ebscohost
- InterScience
- Springerlink
- Google Scholar
- Own literature database

Figure 5: Sources used for literature study

The literature study needs to provide insight to be able to frame the problem, identify the relevant concepts, method/techniques and facts. Moreover, the literature study is needed in order to be able to understand the complex topics that are covered within this study. The literature study is also conducted to position and scope the study. After the collection, analysis and interpretation of the literature study, a qualitative study will be developed in order to collect more specific data.

A qualitative approach is used because the research topic is barely understood. Where (Ghauri, 2005) argues, "Qualitative research is particularly relevant when prior insights about the phenomenon under scrutiny are modest, implying that qualitative research tends to be exploratory and flexible because of 'unstructured' problems (due to modest insights). Even though qualitative research may allow to tests of hypotheses, the main emphasis is usually on gaining insights and constructing explanations or theory."

In order to execute the qualitative research, questions based on the research model are made to be able to answer the research questions. The data for the qualitative research was gathered throughout the use of semi-structured interviews. A list of more then a hundred Dutch firms was made. The organizations included within this list were selected based on the fact that they use EA as a prescriptive framework that guides and constrains the development of IT projects. A further deviation needs to be made in order to balance the amount of organization based on the background of these organizations. A mix of organizations within the public sector, the semi-public sector and the private sector needs to be established.

Within these organizations several "standpoints" with regard to EA need to be contacted to contribute to this research by means of interviews. The various roles targeted within this research are CIO's, (lead) architects, portfolio managers and programme directors. These roles are directly related to EA from different points of interest. Where (Cohen, 2007) states that, "attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint."

Interviews are used to determine the criteria based on which organizations decide whether or not an IT project needs to be governed by means of EA. Besides answering the main question, the interviews are used to answer the sub questions in order to determine the influence of related subjects that derived from the preliminary research. These practices can be compared with that what the literature prescribes. These interviews need to be recorded, transcribed and coded. The coding of the interviews will be based on the interview questions in which statements are assigned to one or multiple interview questions. The statements need to be coded by organization as well, which enables to construct a theory based on case studies. In addition these statements need to be assigned to on or multiple codes that are descriptive for the subjects that are covered within this study.

Within qualitative studies, the research often contains masses of data that needs to be analyzed. Before the theory can be constructed the collected data needs to be analyzed. According to (Ghauri, 2005) "No single, agreed-upon approach to qualitative data analysis exists." However, (Miles, 1994) distinguishes between the following components in qualitative data analysis: data reduction, data display and conclusion drawing/verification. By using various manners to code the interview outcomes and the usage of statements relevant to this research, the data can be reduced to an acceptable amount of data. By coding the statements based on multiple variables such as research questions, interview questions, multiple codes, interrelations and the organization of the data in the form of statements can easily be displayed by specific variables as mentioned above.

1.6   Thesis outline

Chapter 1. Introduction: This chapter describes the context in which this research is executed. The problem statement describes the contextual problem. Furthermore this chapter describes the relevance of this study, the research questions and the methodology, which describes the research design and the methods that were used in order to execute the study.

Chapter 2. Introduction to EA, benefits, drawbacks and costs: This chapter provides a brief description of EA in order to define the terminology and provide a common frame of reference. In addition EA is described within the context of this research. Furthermore, this chapter will be used in order to identify what drives or prevents organizations to use EA and to identify the costs associated with EA.

Chapter 3. EA within the planning and initiation phase of an IT project: This chapter will discuss how IT projects are initiated. Moreover, used in order to determine which processes are needed for initiating and planning IT projects in conjunction with the EA. Furthermore this chapter discusses how and where in these processes the decision whether or not to govern IT projects by means of EA is taken.

Chapter 4. EA compliance: This chapter is used in order to determine which techniques and resources are used when the organization decides use EA within the context of this research. This chapter will be discussed in order to determine whether or not specific techniques and resources are assigned to specific types of projects. In addition this chapter is used in order to define the concept of compliance and the advantages and drawbacks of applying EA within the context of the research.

Chapter 5. Qualitative research: This chapter will describe how the qualitative study was designed and conducted in order to achieve a well-founded result. It describes the approach that was used in order to collect the data, to process the data and to interpret the data. Furthermore this chapter describes the interview design and the research population.

Chapter 6. Conclusion: The final part of this research is the interpretation of the collected data and derived conclusions. Within this chapter the research questions and the main question is answered. By weighing the outcomes of the literature study against the results of the qualitative study, this chapter provides answers to the research questions from a practical point of view. Furthermore the results of qualitative study can be seen as the foundation for forming a theory. Eventually a multi criteria model is presented based on which organizations can determine what resources and techniques are needed in order to ensure project compliance with the EA.

2. Introduction to enterprise architecture, benefits, drawbacks and costs

2.1 Enterprise architecture

Over the last few decades more and more research is initiated to elucidate the principle of Enterprise Architecture (EA). Since the purpose of this research is concerned with EA, a brief description of EA is needed to define the terminology and provide a common frame of reference. Furthermore, this chapter will be used in order to identify what drives or prevents organizations to use EA and to identify the costs associated with EA.

There are many different definitions to be found on the term enterprise architecture. Applying the definition of (IEEE, 2011), "the fundamental organization of a system embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution" on the level of an enterprise is commonly referred to as EA. But what is meant by an enterprise? An enterprise in this context can be defined as follows (Lankhorst, 2005):

> (OpenGroup, 2009) "An enterprise is any collection of organizations that has a common set of goals and/or a single bottom line."

Figure 6: Definition of enterprise

By using this definition of an enterprise (OpenGroup, 2009), "an enterprise can be a government agency, a whole corporation, a division of a corporation, a single department, or a chain of geographically distant organizations linked together by common ownership. The term enterprise in the context of enterprise architecture can be used to denote both an entire enterprise, encompassing all of its information systems, and a specific domain within the enterprise. In both cases, the architecture crosses multiple systems, and multiple functional groups within the enterprise."

EA can be seen as a high level collection of views, models and principles, with the aim of structuring the organisation, its processes, the provision of information and the technology within the organisation and to design and implement this in the most consistent manner. Thereby, EA gives insight into, and an integrated overview of; Business processes, information functionality; information systems and applications, underlying technology and infrastructure. EA can also be defined in terms of its purposes. If EA is used to manage the complexity of an enterprise by visualizing the relationships and interconnections between the various components it is often used as a means of communication. The EA in terms of communication provides insights to its stakeholders. Nevertheless within this research, EA will be used in terms of its second purpose.

When EA is used to govern the design decisions made prior to the enterprise construction and evolution of the various components, it is used as a tool for governance. Using EA as a tool for governance establishes principles, models and policies that govern the evolution of the enterprise by limitation of design freedom. Now that the fundamental purpose of EA is briefly discussed, the various definitions of EA are gathered in order establish an applicable definition for the purposes of this research. The following definitions of EA are commonly used besides the definition of (IEEE, 2011);

(Ross J. W., 2006), "The organizing logic for business process and IT infrastructure capabilities reflecting the integration and standardization requirements of the firm's operating model."

(Bucher, 2006) "The fundamental organization of a government agency or a corporation, either as a whole, or together with partners, suppliers and/or customers, or in part as well as the principles governing its design and evolution."

(Bouwens, 2009) (DYA) "Architecture is a consistent set of principles and models that gives direction to the design and realization of processes, information systems, technical infrastructure and organisational structure."

(Bouwens, 2009) (Archimate) "Architecture is a consistent set of principles, models and methods that gives direction to the design and realization of processes, information systems, technical infrastructure and organisational structure."

(Lapkin, 2008) (Gartner) "Enterprise architecture is the process of translating business vision and strategy into effective enterprise change by creating, communicating and improving the key requirements, principles and models that describe the enterprise's future state and enable its evolution."

Figure 7: Definitions of enterprise architecture

The various definitions show some similarities, although they are applied in various contexts. Assuming that architecture is a generic term for a range of architectures, some definitions still use architecture to define EA. Being more specific in terminology raises the need to distinguish architecture and EA. Furthermore (Ross J. W., 2006) defines organizing business processes and its underlying IT infrastructure derived from a strategic point of view by addressing the firm's operating model. DYA and Archimate specify the components or building blocks more specific by addressing processes, information systems, technical infrastructure and organisational structure. In comparison to Ross, DYA and Archimate provide an architectural framework consisting of models and methods.

Gartner and (Bucher, 2006) do not specify the components or building blocks, where Bucher specifies the organization and Gartner specifies processes. Some definitions address the importance of the relationship between the various components and the relation to their environment, where others do not. One might distinguish EA as a means of communication and a tool for governance guiding the evolution of the enterprise, where others do not.

The twofold within the working definition of EA is not always applied within the different definitions, although this twofold might make the purpose of EA more understandable for the intended audience. A combination of the various definitions and aspects in order to fit the purpose of this research leads to the following definition of EA;

"Enterprise architecture is a consistent set of models, methods and principles that gives direction to the design and realization of an enterprise's organisational structure, business processes, information systems and infrastructure, their relationships to each other and to the environment. The purpose of the principles is to guide the enterprise's design and evolution over time in a coherent manner."

Figure 8: Definition of enterprise architecture

The definition of EA as stated above is derived with the purpose to fit the context of this research. The definition of (IEEE, 2011) is used as primer definition to state that architecture is a generic term that functions as overarching definition for multiple specific architectures. EA is in this context a specific type of architecture, which consists of a core diagram, interrelated architectures and EA principles. The consistent set of models and methods is applied in the assumption that enterprises use models and methods to design and thereby visualize, communicate and document at least the current state and the future state of the components within the EA. Where according to (OpenGroup, 2009), "an enterprise can be a government agency, a whole corporation, a division of a corporation, a single department, or a chain of geographically distant organizations linked together by common ownership."

So EA is a method to visualize and design the current state and the future (desired) state of an enterprise according to the enterprises strategy and the operating model and functions as a roadmap. It is important to state that EA is a tool or a method to guide the evolution of an enterprise and is not a goal on its own. It gives insight and an overview to the business processes, the information functionality, the information systems/applications and the underlying technology and infrastructure their relation to each other and the contribution to the enterprises strategy. When EA is used as an overview to provide insight for its stakeholders, this insight can be used in order to analyse the impact of a change on the existing EA. When EA is used to establish principles, models and policies and thereby offers limitations of design freedom to govern change projects that influence the enterprise, EA is used as a tool to govern for example IT projects. Using EA as a tool to govern IT projects is often referred to as a prescriptive framework that governs the implementation of new components affecting the EA.

2.2 EA as a means to govern IT projects

EA can be used in order to fulfil multiple purposes, but within this research EA is used for a very specific purpose. This paragraph elaborates on EA in the context of this research. Within this research EA is viewed as a facilitating instrument in order to monitor and control IT projects. The focus is on using EA in the stages of initiating and planning an IT project. Therefore EA will be treated as being an instrument in order to facilitate and govern organizational change. The to-be EA or target architecture is the conceptualization and visualization of the intended future state of the enterprise, where according to (OpenGroup., 2009) "There may be several future states developed as a roadmap to show the evolution of the architecture to a target state." The principles often referred to as guidelines are derived from the to-be EA in order to guide the evolution and design of all change projects. Those principles, models and policies can guide the evolution of the enterprise and the possible projects affecting the enterprise.

The possible projects affecting the EA need to comply with the principles, models and policies in order to align them with the enterprise strategic goals that are laid down in the to-be EA. This addresses the importance of the function of EA to govern IT projects. IT projects influencing the EA need to comply with the principles, models and policies in order to align them with the target architecture. If EA is used as a means to govern or to monitor an IT project, principles, models and policies derived from the to-be situation can be seen as a prescription. These prescriptions can be seen as the instrument in order to govern IT projects and after all these prescriptions need to be governed to reach the desired outcome or state of the EA. According to (Foorthuis R. H., 2009) "A prescription, focusing solely on the to-be situation, has an explicit guiding function and is required to take the form of a principle (textual statement), model (visual diagram) or policy statement (exposition containing text and possibly diagrams). These types of prescriptions explicitly provide constraints or directions and are directly related to compliance."

Compliance can be derived from the extent to which a project adheres to the prescription and thereby fulfils parts of the desired outcome as established in the to-be situation. Compliance needs to be ensured for instance through project reviews and procurement policies, these activities are part of the compliance process and these tasks have to be delegated. Various roles with regard EA need to be delegated in order to use EA as a means to govern IT projects, examples of these roles responsibilities are: the architecture board, a review coordinator, the chief- or lead architect, process owners and so on. In addition various techniques such as the PSA and compliance checks can be used. How and whether these resources and means with regard to EA need to be used in order to ensure compliance is the intended scope of this research.

2.3 Principles and guidelines

When EA is used as a means to govern IT projects, the project is subjected to and constrained by principles. In order to understand how EA is used as a means to govern IT projects, the concept of principles and guidelines needs to be included. The degree in which an IT project fits into the desired situation guided and constraint by the principles and guidelines determines whether the project complies with the EA.

Principles are partly attributable from policy statements, which is a within the organization agreed upon and established guiding statement that gives direction to the desired behavior within the organization. These policy statements are derived from the organizations mission, vision and strategy and thereby are closely linked to the organization intended direction. Principles that have been derived from the EA are often referred to as architecture principles. Architecture principles are according to (Godinez, 2010), " a set of logically consistent and easily understood guidelines that direct the design and engineering of IT solutions and services in the enterprise."

Architecture principles are used to establish and guard the synergy between the organizations various layers and components within the EA. This enables the organization to understand the implications of for example IT projects and to use this understanding to justify why certain decisions have to be made. Without the use of guiding principles while integrating changes it is "likely that any solution will become fragmented or it becomes increasingly difficult to exploit design elements across the enterprise." Because the principles are related to the various layers of the EA and possibly to the solution delivery as well, there are various types of principles. The (OpenGroup., 2009), states that "Architecture principles are typically developed by the lead enterprise architect, in conjunction with the enterprise CIO, Architecture Board, and other key business stakeholders." Furthermore they distinguish three levels of principles in a hierarchical relationship: Enterprise principles, IT principles and Architecture principles.

The enterprise principles form the basis for decision-making on an enterprise wide level and give direction to the manner in which the enterprise fulfills its mission. The IT principles provide direction to the design and usage of IT resources. IT principles provide according to (Minoli, 2008), "guidance on the use and deployment of all IT resources and assets across the enterprise. They are developed with the goal of making the information environment as productive and cost-effective as possible." The architecture principles give direction to the fulfillment of the EA process and how the EA needs to be implemented. According to (Minoli, 2008), Architecture principles can be further partitioned as; "Principles that govern the architecture process, affecting the development, maintenance, and use of the enterprise architecture, principles that govern the implementation of the architecture and establishing the first tenets and related guidance for designing and developing information systems."

Within this research, principles are used to govern IT projects and can be related to guidance for designing and developing information systems.

Architecture principles could be further specified into organization specific- and general principles. Furthermore they van be specified throughout the various layers of the EA such as, business-, data-, application- and technology principles. Except for the fact that these principles need to formulated SMART, there are sever several criteria that characterize a good set of principles:

- Understandability;
- Robustness;
- Completeness;
- Consistency;
- Stability.

Figure 9: Criteria for architectural principles (OpenGroup., 2009)

EA principles form a baseline on which the organization makes conscious decisions about IT. The EA principles are used to assess solutions in order to manage the compliance with the EA. Furthermore they function as an input to assessing both existing IT systems and the future strategic portfolio, for compliance with the defined EA. An architecture principle consists of a statement, a rationale statement, an implication statement, a possible alternative and defines the ownership of a certain principle.

The statement is a one liner in which the essence of the principle is displayed. The rationale statement highlights according to (OpenGroup., 2009), "the value of the architecture to the enterprise, and therefore provide a basis for justifying architectural activities." The implications statement also known as consequences provides according to (Minoli, 2008), "an outline of the key tasks, resources and potential costs to the enterprise of following the principle. They also provide valuable inputs to future transition initiative and planning activities." A possible alternative is needed according to (Wagter R. , 2009), because "the strength of a principle derives from the availability of alternative choices. By including the alternative in the description of a principle the strength of a principle is expressed." And a principle can be used in order to determine its ownership, where the owner of an architecture principle is the one that is escalated to if the principle is violated (Bouwens, 2009).

There are various manners for ordering architecture principles such as provided by (Bouwens, 2009) and (Greefhorst D. P., 2011). Although this is out of the scope of this research, these ordering structures provide insights in the fact that there are generic and specific architecture principles. (Bouwens, 2009) Concludes, "80% of the architectural principles that an organization uses consists of best practices that are not specific to that organization. The other 20% exists of more specific principles. Architectural principles can be made more specific if they lead to certain policies used as a directive to guide the evolution of the EA.

2.4 Drivers for using EA as means to govern IT projects

The drivers for EA usage are discussed in order to determine why organizations use EA as a means to govern IT projects. The drivers for the use of EA in this context should not be confused with advantages. Advantages of using EA in this context will be discussed in another chapter. EA, ones initiated to manage the complexity within the development and implementation of information systems, is now used in a broader context. (Zachman, 1987) Developed a framework for which he argued; "due to the increasing size and complexity of the implementations of information systems, it is necessary to use some logical construct (or architecture) for defining and controlling the interfaces and the integration of all of the components of the system." Managing complexity and the IT landscape are still common drivers for EA, but what drives nowadays organizations to make use of EA as tool to govern IT projects?

(Op 't Land, 2009) Argues, "as a result of developments such as globalization, the fusion of business and IT, the introduction of new technologies, novel business models, enterprises are confronted with an increasing variety of options to deal with an ever faster changing environment." Managing the complexity and providing the stakeholders an insight and overview of the complex structure of the entire enterprise and the extended enterprise could be seen as the most referenced and still the most important driver for EA. Although it can be argued that managing complexity is a driver for each enterprise that uses EA, it seems that the drivers of EA tend to arise from the enterprises challenges and therefore are specific to a particular enterprise. The growing complexity within enterprises requires an instrument that provides a good foundation for the execution of the enterprises strategy. Furthermore, an instrument is needed, which is able to assist in the underlying challenges that disable this foundation for execution. Still organizations have a hard time to support the business strategy and the underlying goals with the help of IT.

The causes for a weak foundation for execution can be seen as challenges that address the topic of business and IT alignment. The well-known strategic alignment model of (Henderson, 1993) and the various alignment perspectives could help an organisation to create a foundation for execution. (Lankhorst, 2005), Argues, "In any of these perspectives, an enterprise architecture can be a valuable help in executing the business or IT strategy." In this case business and IT alignment models determine the right alignment perspective and enterprise architecture could be used as a tool to enable this strategic perspective in a broader organizational wide context. EA in this case could assist in order to assist in establishing business and IT alignment, but not eliminate the challenges on its own.

In order to compete in a fast changing environment, nowadays enterprises need to change more often. Change projects could be defined in order to reach the desired state of the enterprise. These desired changes could be implemented by means of projects, which enable the enterprise to reach the desired state. These projects need to comply with the target EA in order to serve their strategic purpose and increase the contribution of IT to the enterprise. This strategic purpose and contribution to the enterprise justifies the long-term investment of the project. In this case EA functions as a tool to support decision making regarding investments on IT with respect to the urge of change.

Increased usage of technology platforms, applications and the processed data creates a set of silos with complex information logistics and interfaces. According to (Dullemen, 2008), the "complexity of IT results in higher costs of changes. Of each euro invested, the largest part is lost on adjustments of interfaces and the interconnection of applications, if this already succeeds." Different new or relatively new IT systems are connected to other IT systems that were already implemented years ago, often referred to as "legacy systems".

Those legacy systems are connected to IT systems by interfaces in order to let the new systems communicate with the IT systems that are already implemented and vice versa. By defining a target EA in which a minimum amount of interfaces is included according to standardized communication languages the costs of the adjustments can be reduced. Thereby the organization controls costs and avoids duplications and silos. Another driver for using EA is obtaining guidance by the possibility to assess project- and investment proposals on their compliance with the desired future state of the enterprise. Decisions based on the assessment of these projects- and investment proposals can be clearly justified in accordance to the EA. Project proposals will be assessed in accordance to the principles and guidelines, which derive from the EA.

In 1996 the American congress initiated the Clinger-Cohen-Act, which was first called the "Information Technology Management Reform Act" (ITMRA). This legislation forced all organisations within the American government to increase the efficiency of IT investments and to reduce IT project failures. The legislation forced the various organisations to develop their own EA, but applicable frameworks or a standard framework were not available. In 1999 the Federal Enterprise Architecture Frameworks (FEAF) was developed as an EA framework for government agencies. This already implicates the value of the driver for EA to justify and increase the efficiency of IT investments. Efficiency of IT projects could be measured in terms of fail rates, where (Rechtin, 2000) argues that fifty- to eighty per cent of technology implementations fail. Although it can be argued that nowadays investment on IT have a higher change for success, it still remains fragile.

Using EA to govern changes that could be implemented by means of IT projects enables effective and efficient business and technology planning, decision-making, change, transformation, and collaboration. (Op 't Land, 2009) Argues, "that classical approaches will handle problems one by one, enterprise architecture aims to deal with these issues in a coherent and integral fashion, while at the same time offering a medium to achieve a shared understanding and conceptualization among all stakeholders involved and govern enterprise development based on this conceptualization." The drivers derived from the above paragraphs are;

- Better control of IT
- Cost control
- Business IT alignment
- The right projects, done right
- Make IT add value
- Avoid silos and duplication
- Supports decision making on IT investments

Figure 10: Drivers for enterprise architecture

2.5 Possible drawbacks of EA

Although the above paragraphs demonstrate the value of EA it seems that the drawbacks of EA are hard to find in literature. The possible drawbacks with regard to the usage of EA might influence the degree to which organizations decide to execute their IT projects, governed by means of EA. Furthermore it could be argued that the drawbacks of EA could negatively influence the usage of EA as tool to govern IT projects. The drawbacks of EA, mentioned in the literature are most of all related to wrong- establishment and implementation and a lack of support. Many stakeholders might value the usage of EA within the enterprise, but still they have a hard time working in accordance to the EA. The lack of support and mandate seems to be the biggest issue for many enterprises (Dullemen, 2008).

According to (Op 't Land, 2009) "an architecture function can only successfully put the architectures it creates into practice with the support of the rest of the organization." The support of EA is not only crucial in achieving architecture driven change, but is also crucial to work in accordance to the EA and thereby comply with the to-be state of the EA established principles and guidelines. If the board of directors and the senior management of the enterprise do not support the EA it is most likely that the EA becomes a part of IT. When EA becomes part of IT, it is possible that the EA will be more focused on the operational level (application and infrastructure) instead of both the strategic and operational level. This will result in an EA that is not well aligned, with less cohesion.

If the level of description of the EA is too high it could be possible that the EA does not provide insight in the specific issues where individual projects have to deal with. The EA is positioned on a level that focuses too much on an ideal situation and too little on the complex reality of today. This often results in principles and guidelines that are used to provide individual projects insight and guidance. Architectural models, principles and guidelines therefore need to be formulated on the right level of abstraction, which is applicable for all stakeholders. A too high level of architectural description will result in unnecessary complexity, where EA is positioned as a tool to reduce complexity. In addition it leads to insufficiency of the EA.

When using EA as a tool to guide and constrain IT projects it is important that the principle as mentioned by (Bouwens, 2009) "Just enough, just in time" is applied. Too much EA at once will result in increasing complexity for those who have to apply it and thereby creates aversion. New general principles, practical policies and standards, detailed models and EA compliance will lead to a different way of working. Nevertheless a different way of working will cost time and effort to implement. Individual projects do not have that time and the resources needed to implement the new structure will only worry about reaching the projects deadline. Too much EA in once will seduce project members to lapse into the "old" established way of working.

The board of directors or the executive management is responsible for initiating changes that are implemented by means of projects. If decision makers do not support the use of EA it is possible that violations in respect to the EA are more likely to occur. The IT management will experience fewer mandate against those who finance the organizational change. Involvement of both business and IT in respect to the EA will enable the enterprise to establish change in a coherent manner and achieve business goals. The support of EA by both business and IT depends on the organizational structure and the applied governance structure. As a result of the drawbacks mentioned above it is likely that resistance against EA usage will occur.

- Insufficiency
- To high level of description
- Not in time, too much
- Resistance against EA usage
- Incomparable cost-benefit

Figure 11: Drawbacks for enterprise architecture

ASSESSING THE DECISIONS MADE PRIOR TO THE USE OF ENTERPRISE
ARCHITECTURE AS A MEAN TO GOVERN IT PROJECTS

2.6 Cost of establishing an enterprise architecture

As the assumption within this research is that organizations base their decision to use EA in order to govern an IT project on a cost-benefit consideration, the cost of establishing an EA is briefly discussed. The "business" or those who are needed for the investment need to be convinced that the usage of EA offers an added value to the organization and the project. They need to be convinced by the benefits they get for it in return. The implementation of an EA function within the organization comes at a cost. It seems that the cost to arrive at a usable EA is hard to find in literature.

(Schekkerman, 2005) Argues that, "The architecture should be tailored to the individual enterprise and that enterprises intended use of the architecture." This implicates that the costs of establishing an EA function within the organization depends on the intended usage and the particular situation of an organization. The establishment of an EA function is associated with costs for personnel, contractor personnel, training, independent validation, methodologies, tools and other costs that cannot be allocated to one of these categories. These costs can be related to the establishment of the entire EA function within an organization.

According to (Dullemen, 2008) it is difficult to make a cost/benefit analysis or business case to justify EA usage. Nevertheless he advices to give it a attempt, because not all business cases have to be positive. Furthermore he argues that it is wise to develop a business case for specific issues that are part of the enterprises architecture. One of these specific issues could be the use of EA in order to guide and constrain the execution of IT projects within the organization. Although, no clear evidence was found on the costs of establishing an EA compliance process, it could be argued that this process is associated with the same costs such as personnel, possibly contractor personal and other resources that need to ensure that the project is executed in compliance with the EA.

Resources that could be used are for example an architecture board or a controlling architect. The resources and techniques that are used in order to ensure project compliance with the EA are extra additions to the existing project- approach and organization. Within this line of reasoning it could be argued that there are IT projects that need to be executed of which the costs of applying EA outweigh the costs of the project. Could this be a criterion to decide whether an IT project needs to be IT project needs to be governed by means of EA? Furthermore, is this a consideration that is based on an individual IT project or is it an overall decision?

2.7 Conclusion

This chapter provides a common frame of reference for EA and in order to indicate in which context EA is used within this research. Furthermore, it answers the question (RQ1): What drives or prevents organizations to govern IT projects by means of enterprise architecture, and do these criteria influence decision-making? From the existing literature, the following drivers and drawbacks can be derived.

If the inverses of these drivers are used, one could argue that these can be used as criteria to decide whether or not an IT project needs to be governed by means of EA. If organizations for example use EA within this context to manage the complexity of a particular project, it could be argued that a non-complex project does not require EA as a means to govern that project. The criterion could be "non-complex and ease of implementation". As an example a stand-alone application that requires at the most a standard coupling, is not complex and easily implemented. The inverses of better control of IT and avoiding silos and duplication can also be regarded as a criterion. So ease of control and coupling can influence the decision whether or not the project needs to be governed by means of EA. Nevertheless, no clear evidence was found and field research must reveal whether this actually applies.

If the inverses of these drivers are used, it could possibly be argued that these can be used as criteria on which the decision whether or not an IT project needs to be governed by means of EA could be based. If organizations for example use EA within this context to reduce the complexity of a particular project, it could be possible that a non-complex project does not require EA as a means to govern that project. The inverses of complexity as criteria could be non-complex and ease of implementation. If EA is used in order to for example implement a relatively stand-alone application that requires at the most a standard coupling, it could be argued that the inverses of better control of IT and avoid silos and duplication, can be regarded as criteria. The inverses of these drivers are ease-of control and coupling. These criteria could influence the decision whether or not IT projects need to be governed by means of EA. Nevertheless, no clear evidence was found and field research must reveal whether this actually applies.

The drawbacks of applying EA as a means to govern IT projects are: insufficiency, to high level of description, not in time and too much, resistance against EA usage and incomparable cost-benefit. It could be argued that these drawbacks influence the decision whether or not to apply EA. For instance, a too high level of architectural principles and guidelines will result in unnecessary complexity, where EA is positioned as a tool to reduce complexity. If the description of the principles and guidelines is too abstract it could lead to insufficiency. If the EA is insufficient for a particular project by means of principles, models and guidelines, the project does not have any common frame of reference to comply with. This could be a possible criterion to decide not to use EA as a means to govern the project.

This chapter also elaborates on the costs of EA. This research is based on the hypothesis that organizations must base there decision to apply EA on a cost-benefit consideration. Therefore we briefly discussed the cost of establishing EA but no clear evedence was found that a cost-benefit consideration is made up front. What was found is that establishing an EA function requires personnel, contractor personnel, training, independent validation, methodologies and tools. We assume that these resources are also used in order to ensure compliance. Further research is needed in order to make an estimation of the costs of using EA as a means to govern IT projects.

3. Enterprise architecture within the planning and initiation phase of an IT project

3.1 IT projects

This chapter will be used in order to determine, which processes are needed for initiating and planning IT projects in conjunction with the EA. Furthermore this chapter discusses how and where in these processes the decision whether or not to govern IT projects by means of EA is taken. First, this paragraph will discuss how IT projects are initiated.

IT projects are initiated to establish technological changes. However, these changes are not autonomous, but part of a larger whole. This larger whole is formed by the direction in which the organization wants to develop itself. Ultimately, these changes are intended to achieve the goals that are derived from the organizations strategy. As technological developments become more important and complex, IT projects are getting larger and have an impact across the entire organization. On might even argue that most of the business projects nowadays even have an impact on the organizations information technology.

(PMI, 2004), "A project is a temporary endeavor undertaken to create a unique product, service, or result."

(Hughes, 1999), "A non-routine task of which planning is required. Specific objectives are to be met or a specified product is to be created. A project has a predetermined time span, which may be absolute or relative. Work is carried out for someone other than yourself. This work involves several specialisms and is carried out in several phases. The resources that are available for use on the project are constrained."

Figure 12: Definition IT projects

Where the definition as stated by the Project Management Institute (PMI) provides a good definition of what a project is, the definition as provided by (Hughes, 1999) specifies the characteristics of an IT project. In comparison to other types of project such as the establishment of a physical artefact, the progress of IT projects is often hard to measure because it is not immediately visible. Furthermore IT projects are exposed to more complexity and a high degree of change. Whereas a physical artefact established by a project is hard to change, an IT solution can be changed. The artefacts delivered by an IT project are also known as project artefacts, which are intermediate deliverables or working products.

When IT projects are related to EA (Op 't Land, 2009) argues that IT projects, "aim to realize parts of the to-be situation. In doing so, the projects need to have a clear view of the to-be and the as-is situation. In the end, project results should not only answer the concerns of the project's stakeholders, but it should also be aligned to strategic directions and constraints." The purpose of EA is to create an overview where all changes possibly made need to adhere to. This overview derives from the intended strategic direction of the organization. During the implementation of a change established by a project this overview is used to monitor that the change is aligned with the desired state of change as defined in the to-be situation. In other words, EA provides a roadmap. Whereas the implementation of the to-be situation is a long-term perspective in which the EA functions, a project is typically initiated in order to shorter-term goals or to achieve parts of the roadmap.

Both IT projects and EA are related to the organizations strategy and its subsequent goals. Where IT projects focus more on the short-term solution, EA focuses more on the long-term solution. Where projects aim on implementing a change, EA provides an overview of the environment in which the projects are initiated. In this case EA functions as a reference for the intended change. Now EA can be used as a frame of reference in order to develop projects in compliance with the desired state of the EA. However EA could also be used in order to determine needed changes. The GAP-analysis compares the as-is situation with the to-be situation of the EA, can be performed in order to identify the needed changes. In this case EA is used to identify possible changes that need to be implemented by projects.

IT projects arise from the need for change, which according to (SOAS, 2012) "the conception stage in a project's life cycle." Nevertheless, IT projects can also arise from the strategic intent of the organization or are identified to solve a particular problem. Furthermore, nowadays IT projects often arise from strategic planning or information strategy planning. The main purpose of information strategy planning (ISP) is according to (Fergerson, 2012), " the development of a plan for implementing business systems to support business needs." Where strategic planning is "the process of determining the mission, major objectives, strategies, and policies that govern the acquisition and allocation of resources to achieve organizational aims."

The result of the organizations strategic planning process is implemented by means of programmes, projects, budgets, processes and procedures. The strategic planning process is an imported input for the organizations EA and contrariwise. The implementation from that what is derived from the strategic planning process has a significant impact on the organizations strategic direction. This strategic direction needs to be clearly communicated throughout the organization including the EA team. When strategic planning is related to EA (Keller, 2012) argues that strategic planning "brings together the goals from strategy and the as-is situation from portfolio management in order to develop a to-be situation. This will be underpinned by a strategic roadmap that is a coarse programme plan for a major part of the project portfolio."

Where the strategic planning process relates more to a corporate level of planning, ISP derives from strategic planning and is more focused on IT. If the ISP process is related to projects and EA (Lakhdiss, 2012) argues, "a project in the context of ISP and EA could be defined as a set of transformations (including creations) applied on architecture elements. Elements are the basic constituents of architecture like applications, processes, servers, databases etc. These elements are combined to create architecture models and diagrams. The transformations of these elements are combined as well to create ISP's projects and programmes."

IT projects become more important in achieving business objectives arisen from the organizations strategic planning processes. Within a strategic planning process both IT and business management ideally determine the business objectives together. Whereas (Wagter R. B., 2005) argues that, "the architect plays an advisory role in this crucial coming together. It is the architect's task to follow developments in the economic sector, business and IT, and to convert these into opportunities for the organization itself." If strategic planning or ISP is the stage in which IT- and business projects are identified, business cases concretize programmes and projects. The organizations top management determines these business objectives. Projects are related to these business objectives and a business case justifies if these objectives can be achieved. However business cases could also arise from opportunities and do not necessarily arises from strategic planning processes.

3.2 Business cases

A second process within initiating an IT project in which EA is involved, is in establishing a preliminary business case. The planning process as described above, determines which business cases need to be made. Parts of the strategic roadmap are according to (Wagter R. B., 2005) "destined to become a business case and is assigned to a particular person, preferably a decision maker." A business case is according to (TBCS, 2009), a "presentation or a proposal to an authority by an organization seeking funding, approval, or both for an activity, initiative, or project. A business case puts a proposed investment decision into a strategic context and provides the information necessary to make an informed decision about whether to proceed with the investment and in what form." The outcomes of these business cases could include the implementation of a certain change by means of projects or programmes.

As mentioned before a business case justifies if a certain objective can be achieved. Business cases however are according to (ITGI, 2006), "not only reviewed once to determine whether to proceed with an investment, and then ignored or, at best, revisited in the post- implementation review. It is an operational tool that should be continually updated throughout the economic life cycle of an investment and used to support the ongoing implementation and execution of programmes, including benefits realization." Moreover they argue, "Business cases must include answers to the 'Four Ares'.

The **Strategic** question. Is the investment:	The **Value** question. Do we have:
- In line with our vision - Consistent with our business principles - Contributing to our strategic objectives - Providing optimal value, at affordable cost, at an acceptable level of risk	- A clear and shared understanding of the expected benefits - Clear accountability for realizing the benefits - Relevant metrics - An effective benefits realization process
The **Architecture** question. Is the investment:	The **Delivery** question. Do we have:
- In line with our architecture - Consistent with our architectural principles - Contributing to the population of our architecture - In line with other initiatives	- Effective and disciplined management, delivery and change management processes - Competent and available technical and business resources to deliver

Figure 13: Four Ares (ITGI, 2006)

The question with regard to architecture in the model as visualized above, implicates that EA already needs to be taken into account within the business case phase. The business case should evaluate the extent to which investments in changes with regard to IT are in line with the to-be situation of the EA. If the solution is inconsistent with the desired state of the EA it might have a negative impact on the organization. Where according to (ITGI, 2006) these "changes are supposed to result in added value regarding the target architecture, meaning constituting a step toward the ideal situation (outlined by the target architecture). This added value can be a criterion used to reject or accept a programme or to choose one programme over another." Besides that EA is involved in the preparation of the business case it could be argued that an architect is needed to at least deliver input to the business case, if he is not already assigned to assess the business case. Furthermore, it could be argued that an architect should be involved in preparing the business case, for example when a high level design needs to be established. The architect should be involved in order to give advice or to develop a high level design in conjunction with the EA. Eventually, when the business case is finished one or more staff members are made responsible for governing these business cases.

3.3 Portfolio and programme management

The portfolio- or programme management function is an important sub-process of initiating and planning an IT project, in which EA is involved. It is important to be involved in this process as an architect, to monitor all possibly executed projects. Ideally all preliminary business cases are filed within the project portfolio. Where the project portfolio is according to (Wagter R. B., 2005), "the total of business cases and projects being carried out at a given moment within an organization." The goal of portfolio management is according to (ITGI, 2006), to "ensure that an organizations overall portfolio of IT-enabled investments is aligned with and contributing optimal value to the organizations strategic objectives by:"

- Establishing and managing resource profiles;
- Defining investment thresholds;
- Evaluating, prioritizing and selecting, deferring, or rejecting new investments;
- Managing the overall portfolio
- Monitoring and reporting on portfolio performance.

Figure 14: Portfolio management (ITGI, 2006)

Portfolio management is responsible for prioritizing and facilitating IT enabled changes and therefore an important stakeholder for the EA team. Communication between portfolio management and architects is crucial in organizations were the architects are not involved in the business case phase. Portfolio management could provide the architect information about which projects are carried out and moreover which projects are started. This enables the architect to overview all possible changes affecting the EA. Nevertheless EA could also be used by portfolio management where (Op 't Land, 2009) argues, "Portfolio management can use enterprise architecture as a common language to coherently define the programmes needed. Indeed, the EA will show which intended components contribute in what extent to which goals and strategy, enabling underpinned choices in adding or removing parts of the organization and technology. At the same time, enterprise architecture needs an overview of the programmes in the portfolio as an in- put."

When portfolio management uses EA, one might argue that classifying the projects based on architectural principles enables better prioritization. Moreover the need for continues change of organizations increases according to (Steenbergen, 2011) "the complexity and leads to high IT costs, difficulties in ensuring reliability of data and in data sharing, and lack of flexibility in offering products and services to customers." In this case EA could be used in order to reduce the complexity and could function as a framework to prioritize new investments.

Organizing, giving direction, monitoring and adjustment of the project portfolio can be seen as the responsibility of the program- or portfolio manager. Therefore it could be argued that the programme manager is an important stakeholder as well. A programme is defined as a group of related projects. These projects are preferably carried out in compliance with the EA. However it might be possible that a program manager bypasses the EA function of an organization. It could be possible that the program manager or a project manager is only committed to time, resources and money, instead of focusing on cohesion between the projects. After all project- and programme management is focused on the managerial aspects of multiple projects. Besides monitoring all possibly executed projects, EA ensures the cohesion between deliverables of these projects. Therefore it is important to be involved within this process as an architect and vice versa to involve an architect within portfolio management for those who manage the portfolio.

3.4 Project approval

If the business case is used as the basis for concretizing an intended change, one might argue that a preliminary business case (as previously described) is needed to identify the intended change and a second level of approval is needed to elaborate on for example the intended solution and its alternatives. Within the first level of approval (portfolio management), it is decided "which ideas are to be elaborated into business cases and which ideas should be abandoned." Elaborating on the business case includes according to (Wagter R. B., 2005), "outlining an overall solution, carrying out impact analyses, detailing the financial basis, drawing up a project proposal. This phase is by (ITGI, 2006) defined as "post- implementation review" in which the business case is updated according to its life cycle.

Where EA in the preliminary business case phase is according (Op 't Land, 2009) primarily used "for the purpose of shared conceptualization in terms of principles and a high level design". Furthermore he argues that EA "helps in scoping the ambition, overseeing complexity and risks, and finally deciding if the organization actually wants to execute the depicted change." The board or executive management makes this decision based on the business case, which is managed by portfolio management. Within this the stage of project approval the EA could be used as a justification for the intended direction of change and the architect could be consulted for the necessary advice. When the decision is made that a particular change needs to be implemented by means of a project, the next question is the organization needs to determine "how to realize and control the intended change."

The above measures already implicate that elaborating on the business case is a multidisciplinary process in which alignment between IT and business is crucial. Especially within outlining the solution and its alternatives, carrying out impact analyses and drawing up a project proposal are stages in which EA plays an important role. If business representatives solely form the solution, it might suffer from misalignment and may lead to overlapping solutions and inconsistency with regard to EA. Therefore a multidisciplinary team led by a business representative together with for example a product manager, one or more architects, information analysts, system experts, and a technical specialist form a business case team.

In outlining the overall solution and its possible alternatives, EA is used to ensure compliance with the principles derived from the EA. (Wagter R. B., 2005) "When it is decided to describe a business case in greater detail, the architects act to provide the necessary architectural principles and models." These architectural models and principles are used as a baseline for the intended solution. The provision of principles and models derived from the EA is according to (Op 't Land, 2009) "aid projects with selections from the enterprises architecture, which are relevant to the scope of the project, additional viewpoints suitable to the concerns of the project's stakeholders, as well as operational criteria to ascertain the compliance of the project's result to the enterprise architecture." Here EA is used to guide and constrain de solution outline in order to ensure compliance with the EA.

Besides elaborating on the financial basis of the business case, which is outside of the research scope, the intended solution is subjected to a risk or impact analysis. This analysis is described in more detail within the next paragraph. Eventually a project proposal is made, which is referred to by (PMI, 2004) as, "a formal, approved document used to guide both project execution and project control. The primary uses of the project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines. A project plan may be summarized or detailed." It needs to be formally approved by those who make the decision whether to accept the proposal or not.

Besides delivering a more detailed business case, the "post- implementation review" delivers according to (Wagter R. B., 2005), "two final products: a business case and a project proposal." Within the project proposal the approach is clarified by inter alia, defining the project organization, the project approach, the delivered products and the planning. It could be argued that this is the stage in which organizations decide whether or not EA is used as a means to govern the IT project. Moreover, whether specific techniques and resources are allocated to IT projects. Where the decision to use EA as a means to govern the IT project, or not could be incorporated as a advice within the project approach, the allocated recourses, used techniques and deliverables with regard to ensuring compliance can be a part of the project planning.

3.5 Impact and risk analysis

As the impact and risk analysis is an important asset to determine the organization of control for a project, we assume that it is also an important asset to determine whether or not an IT project needs to be governed by means of EA. Although the impact and the risk analysis could be used for multiple purposes, they will be described from an EA point of view with regard in order to fulfil the purpose of this research. An impact and risk analysis can be conducted based on the overall solution outline (business case). According to (Lankhorst, 2005) an impact analysis is "a given an entity within the architecture which is considered to be modified or changed, which other entities in the description are possibly influenced by this change. If the processes of establishing and elaborating on the business case with respect to EA are followed.

Even if the intended changes are most likely to comply with the EA, it is possible that the intended change influences components within the EA that need to be changed as well. In the case of a project, the impact analysis can be used as an indicator for EA to determine which components within the EA are likely to be changed. "This allows architects to assess the consequences of a particular change to the enterprise, so to identify potential impacts of a change before it actually takes place" (Boer, 2010).

The impact analysis is performed to anticipate on the consequences that the intended changes has for the existing EA, moreover how these changes relate to the strategic intend and the to-be EA. The intended changes need to be analyzed in accordance to their impact on the various layers of the EA. Performing an impact analysis enables (Boer, 2010) to "analyze the effect at a business level of a change that takes place at a technical level." Besides the impact on the EA, the impact on other projects needs to be taken into account. If the intended change has a large impact on the existing EA and on other projects it could be possible that more changes might be needed.

(Boer, 2010) Argues that, "the outcome of an impact analysis of change an be used as a measure for the effort of a change: the more the change causes other rippling changes, in general, the higher the cost is." Although (Wagter R. B., 2005), argues that this "phase also includes elaborations of implementation, control, and planning issues." However no clear evidence was found that the impact of a project on the EA is used to determine the amount of control and allocation of resources. After all, this is an input for the decision whether and how to proceed with the intended change.

A risk analysis could be performed to analyze the potential risks associated with the intended change. It is referred to as the process of analyzing and evaluating the possible risks of programmes or projects. According to (ITGI, 2006), "Any identified risk with significant impact should be documented and a person should be assigned with the responsibility, authority and resources for managing that risk." The risks of the intended change with regard to EA could be:

- ▪ Not in line with the EA
- ▪ Not consistent with the EA principles
- ▪ Not contributing to the population of the EA
- ▪ Not in line with other initiatives

Figure 15: Project risks associated with EA (ITGI, 2006)

Except from the risk associated with EA, a project or a programme can be associated with risks varying from implementation risks to security risks. According to (OpenGroup., 2009) "risks are normally classified as time (schedule), cost (budget), and scope but they could also include client transformation relationship risks, contractual risks, technological risks, scope and complexity risks, environmental (corporate) risks, personnel risks, and client acceptance risks."

Where risk analysis can be seen as the identification of risks associated to a project or a programme, risk management however can be seen as the allocation of resources to manage the risks. Risk management involves (Norris, 2000): "the use of information collected during the risk analysis phase to make decisions on how to improve the probability of the project achieving its cost, time and performance objectives. This is done by reducing the risk where advantageous to do so and monitoring and managing the risk, which remains."

If allocating resources for managing risks is a derivative of the risk analysis, one might argue that the amount of "control" derives from the associated risks. Where (Westfall, 2007) argues, "Higher risk projects (or programs), will typically require more stability and therefore more rigorous control techniques." Although the allocation of resources and techniques with regard to EA in order to "control" an IT project is a subject within the next chapter, this statement already implicates that the organization of control depends on the risks of a project. To conclude, could the risk associated with a project be seen as criterion on which organizations base their decision whether or not an IT project needs to be governed by means of EA?

3.6 Whether or not to govern IT projects by means of EA

The previous paragraphs within this chapter describe more or less the process in which the decision, whether or not an IT project needs to be governed by means of EA is taken. This process is often referred to as the strategic dialogue (Berg M. S., 2007) (Bouwens, 2009) (Op 't Land, 2009) (Wagter R. B., 2005) (Steenbergen, 2013). The strategic dialogue is included within the Dynamic Enterprise Architecture model (DYA). This model can be seen as the only theoretical assumption that organizations make a conscious decision to carry out a project or programme without compliance with the EA.
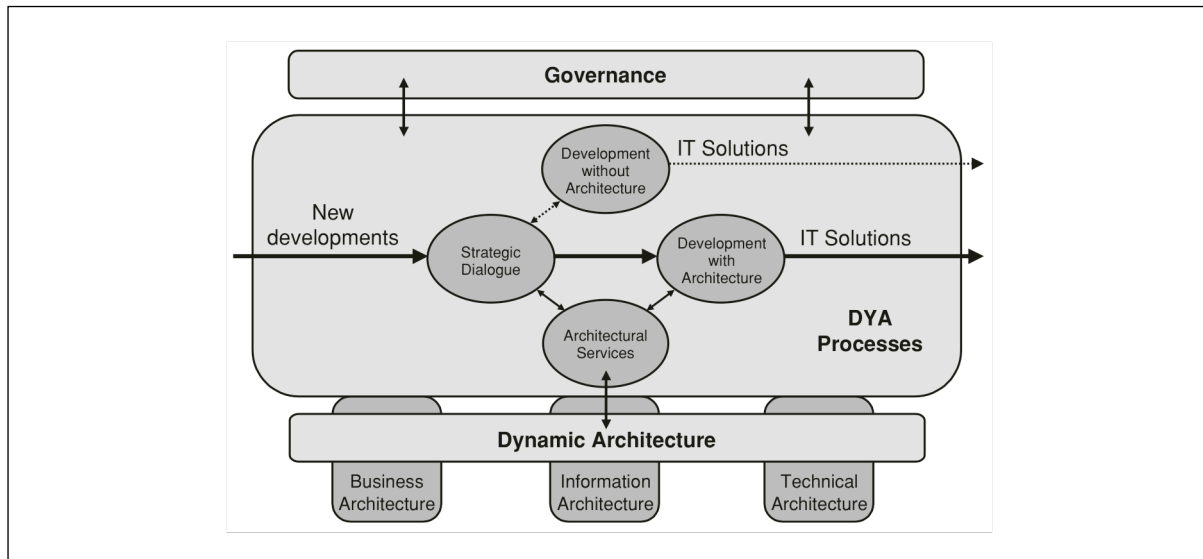
Figure 16: DYA Framework (Berg M. S., 2007)

Although this decision is more related to EA compliance, within this research development with architecture is equivalent to, govern an IT project by means of EA. Where development with EA in the context of this model is "the extent to which software developers have acted in accordance with the 'practices' set down in the standard (Emmerich, 1999)." It is seen as an equivalent because means with regard to EA are needed to govern these developments, when decided to develop with architecture. Moreover a solution implemented by means of an IT project and developed without architecture, implicates that no further means with regard to EA are needed to govern an IT project.

The EA guides and constrains the development of projects by means of guiding principles that are used in order to ensure the fit of a specific solution ad the moment and in the future. Even though the solution outline and possibly other pre-project artifacts are guided with principles and models provided by architects, the actual decision to "develop with or without architecture" is taken after the architectural team delivered their architectural services to the strategic dialogue.

Bringing forth changes by means of an IT project has an effect on the components of the current and future state of the EA. Those components often do not operate solely and are most likely to affect other parts of the EA. Therefore (Op 't Land, 2009) argues that, "by default, projects are realized using the enterprise architecture (development with architecture), but situations may occur in which projects are realized without conformance to the enterprise architecture (development without architecture)." In the development and implementation of those changes, the organization needs to take into account the total life cycle of a particular component.

Figure 17: DYA Processes (Wagter R. B., 2005)
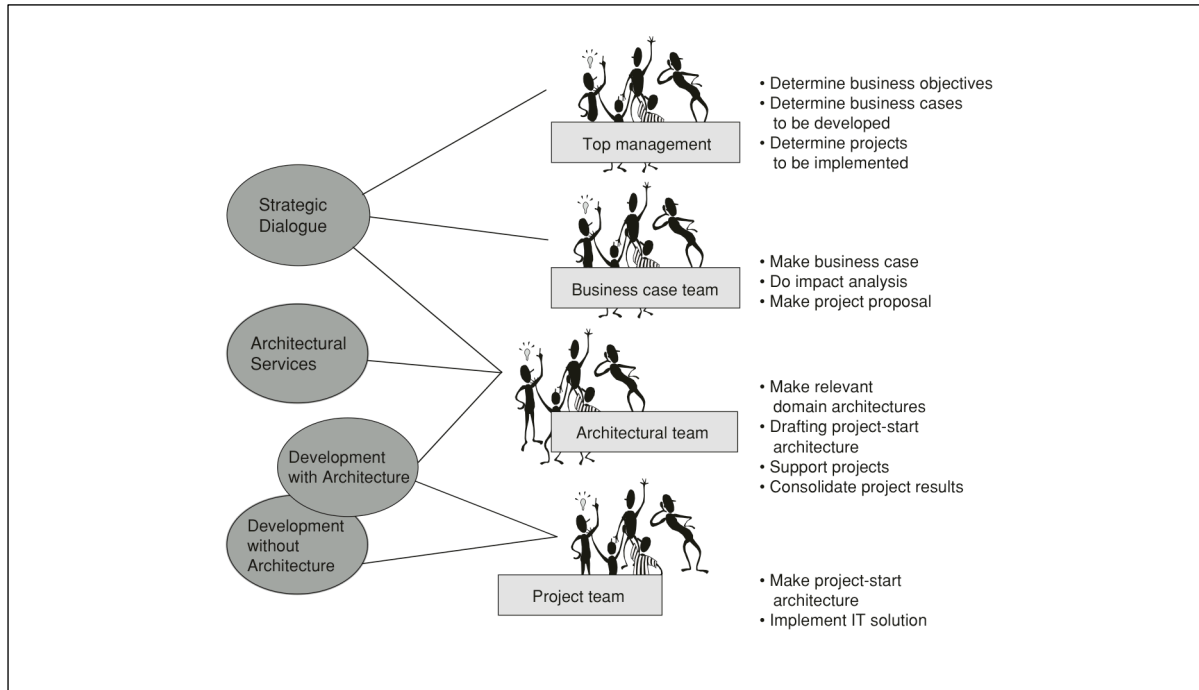
This model provides the alternatives to develop with or without architecture, which is referred to in terms of effectiveness, "doing the right things." This alternative of whether or not an IT project needs to be governed by means of EA, implicates that there is actually a decision made. The question rises, based on which criteria do organization make this decision? (Berg M. S., 2007) "Development without architecture is a deliberate choice in special circumstances, perhaps involving extreme time pressure, to deviate from the architectural framework. Furthermore there is argued that "time, in such situations, can become such a dominant factor and architecture is easily forgotten."

The criterion time applies primarily to IT projects that arise from opportunities. Whether an organization is capable to anticipate on the unplanned changes depends according (Wagter R. B., 2005), "to the speed at which the opportunity or threat emerges and dies down again and the time that the organization needs to plan and implement its response. These unplanned changes arise from opportunities emerge mainly from external influences such as compliance with regulatory compliance, changes within the supply chain or customer demands." These situations force the organization to react in a forced manner and therefore might work around the EA compliance process. Ideally the decision to occasionally bypass the EA compliance is made in mutual agreement between those who govern the compliance process and those who are responsible for the project.

Except for the criterion time (Wagter R. B., 2005) states that "within the process of development with(out) Architecture, there are three development strategies." Nevertheless it could be argued that these perspectives are directly related to speed. Where the degree in which an opportunity or a threat occurs is weighed against the degree in which the organization is able to follow its normal planning process.

- Anticipative;
- Defensive;
- Offensive."

Figure 18: Development strategies (Wagter R. B., 2005)

Within these three development perspectives it can be argued that the anticipative strategy is most likely to be applied. This process is characterized by a close cooperation between architectural services and project-based development in compliance with the EA. Within this development perspectives means and techniques with regard to EA, such as a project start architecture (PSA) are used to ensure that project is carried out in accordance to environment in which it needs to operate. If this process is seen as using EA within the context of this research, one might argue that the decision whether or not to use EA as a means to govern IT projects is made before delivering architectural services such as a PSA to the project.

A defensive strategy is as the name already implicates a strategy that derives from a situation in which the organization initiates a change in order to defend itself. The defensive strategy is characterized by situation in which the organization for example needs to react to developments with regard to their competitive position. The offensive strategy is characterized by situation in which the organization reacts to opportunities to establish competitive advantages. The offensive strategy can be used in order to force competitors to react from a defensive perspective. Where (Wagter R. B., 2005) argues that, "the defensive/offensive strategy is characterized by time being the all-decisive factor in the development process. Anything can be changed, including the working method, and even functionality or quality, but not the final date of the project."

The defensive and offensive development strategies are permitted by means of a management letter, in which the management decides to deviate from the anticipative approach. Because both the defensive and offensive scenarios are not based on the "ordinary" project development process, these projects do not meet the EA requirements. Therefore results of the project often do not fit well into the EA. In addition, projects based on this approach do not take into account the maintainability of the solution. This will increase the risk that the solution is not durable and even can be prohibitive for the organization. Therefore, it is essential to shorten the durability of the delivered solution and develop a suitable solution in parallel according to the anticipatory scenario.

Besides the criteria, time constraints and the development scenarios that arise from the time criterion, there is another criterion of which could be argued that it derives from time constraints. This criterion is that the EA is not sufficient and thereby does not provide the project, the insight that is needed. In this case extra architectural services need to be delivered by means of drafting architectures. Something of which (Greefhorst D. , 2011) argues that, "drafting architectures often takes too much time, so that projects are delayed and organizations decide to (partly) to develop without architecture." Where the development of a specific solution and its alternatives is supported by architectural services such as models and principles, it might be possible that these services are not sufficient for the particular needs.

If the EA and its services are not sufficient an increase of effort is needed to deliver those services that were actually needed. Therefore one might argue that the delay needs to be weighed against the development costs and the throughput time of the project. Is it worth it to deliver these extra services or do these services put pressure on the projects costs and planning? In other words can the benefits be weighed against the costs? After all services with regard to EA need to be subservient and those who use these services should not get the impression that they suffer from it. Nevertheless no clear evidence for other criteria than time constraints and insufficiency of the EA were found.

3.7 Conclusion

This chapter answers the question (RQ2): Which processes are needed for initiating and planning IT projects in conjunction with the Enterprise Architecture and where in these processes is decided whether or not an IT project needs to be governed by means of Enterprise Architecture? And (RQ3): Which criteria, reasons and techniques are used by organisations to assess and decide whether or not an IT project needs to be governed by means of Enterprise Architecture? Within this chapter it became clear that the literature suggests that the process to decide whether or not an IT project needs to be governed by means of EA, can be depicted as follows.
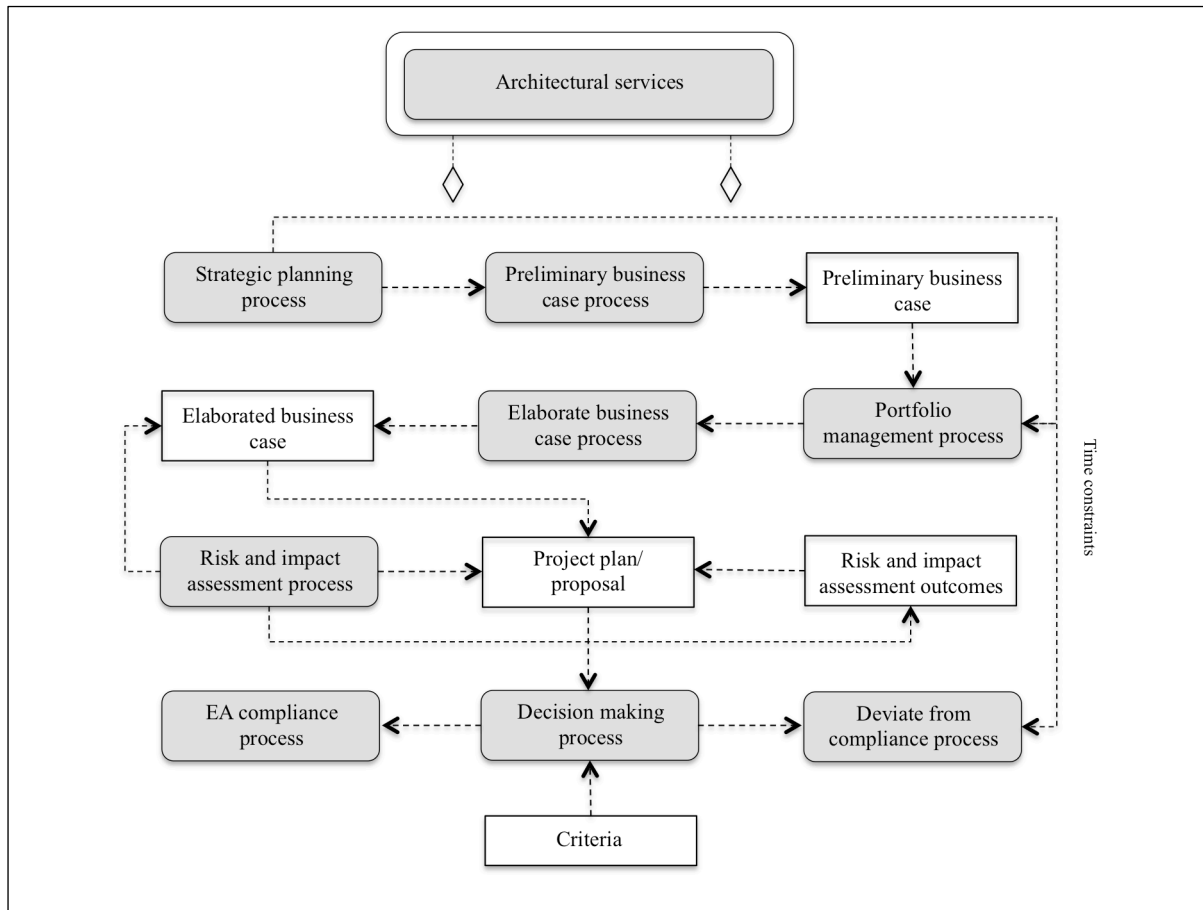
This process is primarily based on the Dynamic Enterprise Architecture (DYA) processes and is complemented by other literature. Within these processes architectural services are delivered in order to create an overall solution outline in conjunction with the EA. These architectural services are ideally delivered to the strategic planning process and the business case stages. These services with regard to EA are provided by means of principles, models and policies and possibly the involvement of an architect. The strategic planning process is referred to as the process in which the urge for change becomes clear. This process could exist of sub processes, for example information strategy planning, strategic planning, opportunities and possible projects that arise from the EA self. Apart from which of these sub-processes is used, all of them require input from the EA by means of principles, models and policies. Moreover, the input by an architect could also be valuable within these sub-processes.

Within the preliminary business case EA could be used as a means in order to ensure that the investment is in line with the EA, is consistent with the EA principles, contributes to the realization of the EA and is in line with other initiatives or projects. Furthermore, an architect is needed to at least deliver input to the business case, if he is not already assigned to assess the business case.

As the preliminary business case is approved and gets the mandate to be executed by means of a project. It could be argued that a second level of approval is needed to elaborate on the solution outline, its alternatives, drawing up a project proposal and carrying out a risk and impact analysis. The above measures already implicate that elaborating on the business case is a multidisciplinary process, which needs to be carried out in conjunction. If business representatives solely form the solution, it might suffer from misalignment and may lead to overlapping solutions and inconsistency with regard to EA. The solution outline, its alternatives, carrying out a impact and risk analysis and drawing up a project proposal are activities in which EA and therefore architects needs to incorporated. Therefore a multidisciplinary team led by a business representative together with for example a product manager, one or more architects, information analysts, system experts, and a technical specialist form a business case team.

Furthermore, there are multiple other processes in which EA and architects fulfill an important role. These processes are the portfolio management- and the risk and impact assessment process. It could be argued that organizations decide whether or not an IT project needs to be governed by means of EA, based on the risk and impact analysis that was conducted on the solution outline and the project plan. The decision to development with architecture as captured within the DYA model is seen as an equivalent of the decision to govern an IT project by means with regard to EA. Because means with regard to EA are needed to govern these developments, when decided to develop with architecture. Moreover a solution implemented by means of an IT project and developed without architecture, implicates that no further means with regard to EA are needed to govern an IT project. If organizations base their decision on the risk and impact analysis, it could be argued that this is one of the techniques used to assess and decide whether or not an IT project needs to be governed by means of EA.

One of the most frequently cited criterion to deviate from using EA as a means to govern IT projects is time constraint. Furthermore, the defensive- and offensive development scenarios or strategies can be classified as criteria to deviate from applying EA. A defensive strategy is as the name already implicates a strategy that derives from a situation in which the organization initiates a change in order to defend itself. The offensive strategy is characterized by situation in which the organization reacts to opportunities to establish competitive advantages. Nevertheless it could be argued that these development strategies arise from time constraint as well. To conclude no clear evidence of criteria other then time constraints and insufficiency were found so far. However it could be argued that when the criteria time constraints and insufficiency of the EA apply, they can be detected earlier in the process. Especially when architects are involved within the stages before there is elaborated on the business case.

4. Enterprise architecture compliance

4.1 IT projects in compliance with EA

This chapter is used in order to determine which techniques and resources are used when the organization decides use EA within the context of this research. This will be discussed in order to determine whether or not specific techniques and resources are assigned to specific types of projects as implicated within (OpenGroup., 2009) and by (Westfall, 2007). After the process of initiating a change, referred to as the strategic dialogue in the previous chapter, the organization can decide to implement a certain solution by means of a project in compliance with the EA. This is referred to as carrying out an IT project in compliance with the EA. Various techniques can be used to ensure the projects compliance with the EA.

(Wagter R. B., 2005) "In addition to the strategic dialogue, architectural services also facilitate compliance with the EA. This is done by means of the sub-process of drawing up project-start architecture (PSA)." This statement implicates that the first technique used in carrying out an IT project in compliance with the EA. This line of reasoning is confirmed by, "a PSA is drawn up at the beginning of a project. If a project is related to the compliance with the EA, the EA is to broad to relate to the functional and technical design for a specific solution. Therefore a PSA is needed, which is established on the project level. The PSA "inherits and translates the prescriptions from the EA, and possibly a DA, to prescriptions that are tailored to the specific project at hand. The project, subsequently, must further detail and design the proposed solution within the specified boundaries (constraints) of the PSA (Foorthuis R. B., 2007)." Furthermore (Foorthuis R. , 2012) argues, "The PSA provides the constraints and general description for the further elaboration of the projects fundamental design." The PSA exists of an environmental model, the scope of the IT solution, the design choices and the standards and guidelines.

Furthermore the PSA is used by means of an architecture contract in which both the project organization and the architects agree upon the boundaries in which the solution should be created. Where (Wagter R. B., 2005) argues, "Good project-start architecture function as a service-level agreement (SLA), both toward the organization itself and toward an external party, if the project are contracted out. The project-start architecture can be used to test whether or not the project delivers what was agreed upon." It is most likely that the PSA is made by the project organization itself. Nevertheless one could argue that the PSA needs to be made by an architect or needs to be established in collaboration. It is often argued that the use of a PSA enables the project to start faster because it scopes the project in an early stage. Normally the PSA contains no extensive content, however (Wagter R. B., 2005) argues, "The extensiveness of the project-start architecture depends entirely on the situation and the degree in which organization-wide architectural principles have been formulated."

Besides using a PSA the EA compliance process consist of various stages in order to ensure project complinace with the EA. Within these processes resources and techniques with regard to EA have to be allocated. (Foorthuis R. , 2012) Proposes a process model of working with EA to ensure project compliance. This model provides an overview of the key processes that need to be executed during "working" with EA. The processes are:

- ▪ Apply EA boundaries
- ▪ Provide advice on EA application
- ▪ Perform project action conforming to EA
- ▪ Add entry to EA Feedback Report
- ▪ Review Baseline
- ▪ Manage EA

Figure 19: Processes in working with EA (Foorthuis R. , 2012)

As de model already implicates the first process of applying EA boundaries is carried out by a project member. Where the architects are responsible for delivering the PSA template and those principles that relate to the project, the project member is responsible for assessing these principles. After assessing the principles the project member creates the PSA. Finally, the delivered PSA is reviewed and approved by its stakeholders, before the final version is distributed.
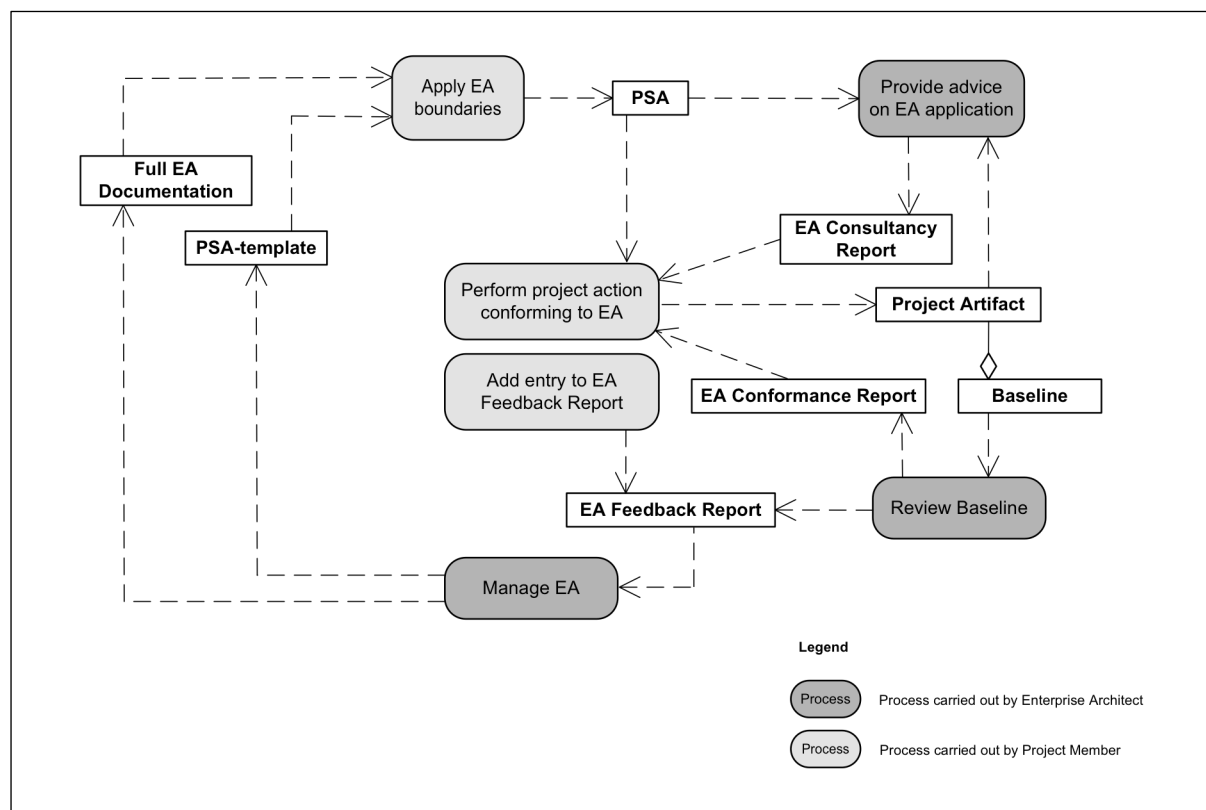
Figure 19: Processes in working with EA (Foorthuis R. , 2012)

The second process is to provide advice on EA application. In this stage an architect is responsible for carrying out this process. This role might be referred to as the controlling architect as described later on. The architect studies and analyses the project based on their deliverables, such as the PSA. Based on this analysis the architect advices the project in order to ensure compliance. Finally, the architect delivers an EA consultancy report that is distributed to the projects stakeholders. Note that the stakeholders as described within the first two processes might be represent by means of an architecture board. In this case the approval and distribution might take place within the architecture board.

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Perform project action conforming to EA is referred to as the "generic process for carrying out a project action that needs to be consistent with the prescriptions of the EA (Foorthuis R. , 2012)." This is a responsibility carried out by the project team. At first the analysis of the relevant EA prescription as stated within the PSA. However it could be possible that these prescriptions are still too vague. In his case the project assesses the more detailed prescription or ask for elaboration by an architect. After the boundaries of the project are clear to all of its members, the project can continue to implement the desired solution.

The next process also executed by the project team is, add entry to EA feedback report. This "action evaluates the applicability of the Enterprise Architecture from a project perspective." The deliverables created by the project are referred as project artifacts. Those artifacts can be assessed in order to evaluate the EA compliance in the subsequent processes. While the project team carries out the implementation of a solution, the project members might experience issues with regard to adhering to one or more principles. After the issue is analyzed it is reported as feedback within the EA feedback report. It could be argued that some of these issues are so serious that the project team needs to differ from the agreed upon boundary. In this case the project team needs to escalate to make a request for dispensation.

The review baseline process reviews the project outcome or parts of the project outcome on EA compliance and results in the EA conformance report. This process is carried out by an architect and is based on the baseline. The baseline derives from the agreed upon solution, possible software architecture, PSA, the EA and its derived principles. The project outcomes are project artifacts, which can be evaluated against the baseline. Within this process the architect prepares a compliance test in which the most recent prescriptions are gathered and the baseline is determined. Eventually the baseline will be compared with the projects artifacts by means of compliance checks.

(Foorthuis R. , 2012) Proposes four types of compliance checks for assessing the EA prescriptions that have been implicitly or explicitly applied in the baseline's project artifacts:

Compliance checks	
The correctness check	"Verifies whether a given prescription is applied by the project in a way that is in accordance with its intended meaning, rationale and usage. In other words, this check verifies whether the application of the prescription deviates from the prescription as it was intended by the enterprise architects."
The justification check	"Verifies whether the (lack of) application of a given prescription is justified, depending on its relevance and priority in the specific situation. The justification check's actual execution is dependent upon certain conditions."
The consistency check	"Verifies whether, if a given prescription is applied, required related prescriptions are also applied. Some prescriptions, especially those at lower abstraction levels, might need to be implemented as a package."
Completeness check	"Verifies whether all the prescriptions are applied. Minimally, the prescriptions that have been designated as mandatory (perhaps dependent on specific project situations) need to be applied, so as to avoid projects applying merely a convenient subset."

Figure 20: Four types of compliance checks (Foorthuis R. , 2012)

After applying one or multiple compliance checks, the architect makes a judgement based on the degree in which the project is carried out in compliance with the EA. This judgement is reported within a report and evaluated with the project team. The architect reports the final result to the lead architect, before he enters the feedback loop. This is the last process in order to ensure project compliance with the EA. Within this last process, which is referred to as managing the EA, the architect includes the results of the project to the EA and thereby revises the EA. Besides updating the existing EA, the architect creates or updates the PSA template if for example the principles need to be changed in accordance to the updated EA. The EA feedback report is received in order to optimize the various processes within the process model. Based on the applied prescription a project can have three possible outcomes. The architect applies the status passed if the project adheres to the baseline, failed if the applied prescription failed the test and needs attention if the project differs from the intended baseline.

Except from the formal techniques as described by (Foorthuis R. , 2012), project architects and controlling architects can guide a project to ensure that the solution is implemented in compliance with the EA. The role of a project architect is delegated to an architect or a member of the project team. Therefore it is not a function and the emphasis is on a temporary role. Except from the responsibilities that this project member has from its normal function, he guides the project team in making the right choices that fit into the long-term perspective of the organization as a whole. The nature of the project determines which member or architect is most suitable.

Besides a project architect, another role with regard to EA can be delegated to a project. This role is known as the controlling architect, in contrast to the project architect, the controlling architect is not an integral part of the project team. During the project, the controlling architect controls the various products that are delivered by the project. These deliverables are validated based on the fact if they meet the architectural requirements as agreed upon within the PSA. It could be argued that the controlling architect is preferred over the use of a project architect, because of its independency. However no clear evidence with regard to these two roles was found.

During the realization of a programme or project, the project manager is often in the lead. It could be argued that the task of the project manager is to deliver the solution within the boundaries as agreed upon in the PSA. Nevertheless it could be possible that the project manager needs to differ from the agreed upon solution due to time- or budgetary constraints. However the project manager does not decide in isolation and escalates to the architecture board. It could also happen that a project or controlling architect escalates to the architecture board when the project deviates from the agreed upon solution. If the project team needs to deviate from that what was agreed upon, the project team has to make request for dispensation at the architecture board. A request for dispensation is used as the mechanism to request a change to the existing architectures, contracts, principles, etc. (OpenGroup., 2009).

According to (OpenGroup., 2009) "This body should be representative of all the key stakeholders in the architecture, and will typically comprise a group of executives responsible for the review and maintenance of the overall architecture." The key stakeholders are in this case the client who actually needs a specific change, the architect and the project manager. In this case business management represents the role of the client, the architecture management represents the architect and the program manager represents the project manager. In addition the executive management could complement the architecture board. Although the architecture board cannot be seen as a technique, but more as a means with regard to ensuring EA compliance, it is a key element in ensuring project compliance. One of the tasks of the architecture board is to enforce compliance.

4.2 The allocation of resources and techniques

This paragraph will elaborate on question whether specific techniques and resources need to be allocated to IT projects, when the organization decides to use EA within the context of this research. Within the previous chapter there was indicated that, "Higher risk projects (or programs), will typically require more stability and therefore more rigorous control techniques (Westfall, 2007)." As this statement already implicated that the organization of control depends on the risks of a project. This paragraph discusses if other conditions influence the allocation of resources and techniques with regard to EA in order to "control" an IT project.

Within the above line of reasoning (OpenGroup., 2009) argues, "For smaller-scale projects, the review process could simply take the form of a series of questions that the project architect or project leader poses to him or herself, using the checklists provided below, perhaps collating the answers into some form of project report to management." This statement implicates except from the fact that the scale of a project could be a criterion, that the amount of "control" is determined by this criterion. Moreover, this confirms that the criterion, scale of a project affect the allocation of specific techniques and resources to IT projects.

Furthermore (OpenGroup., 2009) argues, "Where the project under review has not involved a practicing or full-time architect to date (for example, in an application-level project), the purpose of the review is typically to bring to bear the architectural expertise of an enterprise architecture function. In such a case, the enterprise architecture function would be organizing, leading, and conducting the review, with the involvement of business domain experts." This statement implicates that the impact of an IT project on a certain level of the EA could be a criterion to determine the amount of "control. Moreover, it argues that not every project needs to have a practicing architect. If the architect is not allocated to the project, a compliance check cannot be seen as a substitute for the architect, "but it can be a supplement or a guide to their involvement." The impact of an IT project on a certain level of the EA can be measured by the impact and risk analysis as described within the previous chapter.

Finally (OpenGroup., 2009) argues, "In most cases, particularly in larger-scale projects, the architecture function will have been deeply involved in, and perhaps leading, the development project under review. In such cases, the review will be coordinated by the Lead Architect, who will assemble a team of business and technical domain experts for the review, and compile the answers to the questions posed during the review into some form of report." Again, the scale of an IT project can be seen as a criterion to allocate specific resources and techniques. The criteria "scale, risk and impact" could be seen as the criteria to decide whether or not an IT project needs to be governed by means of EA. Moreover, these criteria confirm the consideration about the use of certain tools and techniques.

Besides the evidence as displayed above, no concrete other sources then (Westfall, 2007) and (OpenGroup., 2009) were found. It could be argued that applying means and techniques with regard to EA results in an additional- ballast and processes for the current project organization of an IT project. Therefore it could be possible that organizations consider if the cost of those resources outweigh the benefits. Even when this is not the consideration, it could be argued that there at least need to be considered, if those resources outweigh for example the necessary "control". This however needs to become clear within practice.

4.3 Compliance and conformance

If an IT project is carried out in compliance with the EA it does not necessarily mean that the solution implemented by the project is compliant. The degree in which the agreed upon solution is implemented in compliance with the EA determines whether the project outcome is compliant with the EA. The techniques such as compliance checks can determine whether a particular solution delivered by a project is implemented in compliance with the EA. Therefore the above techniques can be used to govern the project team in delivering the solution within the agreed upon boundaries.

According to (OpenGroup., 2009), there are certain degrees in which the agreed upon solution as defined in an architecture contract, the PSA or a baseline is actually implemented. The architect could apply a status to the degree in which the project has applied certain prescription after carrying out a compliance check. In which the architect applies the status passed, failed and needs attention. Nevertheless one could argue that the typology of the model provided by (OpenGroup., 2009), is more accurately to determine whether the agreed upon solution is implemented as defined by the prescriptions.

Within the model the prescription have been appointed as architecture specifications. If the implementation delivered all off the architecture specification and nothing apart from these specifications, the project can be classified as being fully conformant. Although the literature uses a terminology in which compliance can be referred to as conformance. It could be argued that compliance is the minimum threshold, which must be obtained.

Irrelevant:
The implementation has no features in common with the architecture specification (so the question of conformance does not arise).

Consistent:
The implementation has some features in common with the architecture specification, and those common features are implemented in accordance with the specification. However, some features in the architecture specification are not implemented, and the implementation has other features that are not covered by the specification.

Compliant:
Some features in the architecture specification are not implemented, but all features implemented are covered by the specification, and in accordance with it.

Conformant:
All the features in the architecture specification are implemented in accordance with the specification, but some more features are implemented that are not in accordance with it.

Fully Conformant:
There is full correspondence between architecture specification and implementation. All specified features are implemented in accordance with the specification, and there are no features implemented that are not covered by the specification.

Non-conformant:
Any of the above in which some features in the architecture specification are implemented not in accordance with the specification.

Figure 21: EA compliance & adherence (OpenGroup., 2009)

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4.4 Advantages or drawbacks of project compliance

As argued within the first chapter most of the advantages directly related to the usage of EA can only be achieved if the organization works in accordance to the EA. This is confirmed by (Foorthuis R. , 2012) which argues, "Compliance of projects subsequently results in an increased ability to achieve EA-related benefits. At the enterprise level, conformance has significant effects on achieving business/IT alignment, accomplishing enterprise-wide goals and integrating, standardizing and deduplicating processes and systems." Nevertheless the projects that are carried out in compliance with the EA could ensure benefits for the project itself as well. Since this research is concerned with the use of EA in order to guide and constraint IT projects, only the benefits on a project bases will be discussed. Besides ensuring benefits, it could also be possible that the use of EA could result in drawbacks. These drawbacks that might possibly occur will also be discussed and kept central to IT projects.

Furthermore (Foorthuis R. , 2012) argues, "At the project level, conformance is shown to have significant effects on the ability to manage complexity, delivering the desired quality and delivering the desired functionality. Interestingly, project compliance with EA has the strongest effects on organization-wide benefits, whereas projects themselves benefit to a lesser extent and in more subtle ways." This can only be achieved if the projects are actually carried out in compliance with EA. In this case it is important that compliance is the minimum threshold, which must be obtained via implementing a solution by means of a project. When this is the generic development standard in which IT projects are used to implement a certain solution in compliance with the EA, the following benefits can be achieved.

If projects are initiated and carried out in compliance with the EA it is argued that the project costs and the project duration is reduced. By explicitly determining a particular solution in compliance with the EA in advance, the project team knows what is expected of them. Thereby a project team is more focussed on the predetermined solution outline. This solution outline is concretized within the project by designing and developing the details of the particular solution in compliance with the EA, the EA guides and constraints these types of decisions. Furthermore guidance by the EA could be used to make development decisions when running up against specific problems during the project. It could be argued that this saves time and perhaps resources.

(Slot, 2010), Argues that projects based on a solution architecture correlates with the following effects; "19% decrease in project budget overrun, an increased predictability of project budget planning, which decreases the percentage of projects with large budget overruns from 38% to 13%, a 40% decrease in project time overrun, an increased customer satisfaction with 0.5 to 1 point on a scale of 1 to 5, a 10% increase of results delivered and increased technical fit of the project results. Nevertheless it could be argued that some of these benefits are questionable. Although (Foorthuis R. , 2012) does not specifically examines the usage of solution architecture but project compliance he argues within his research "several hypothesized project benefits could not be confirmed, such as exceeding deadlines and budgets less often, and delivering the required functionality more frequently."

When a particular solution is implemented in compliance with the EA, the environment in which the solution needs to operate is also taken into account. Leveraging the EA function of creating an overview in which the solutions needs to operate enables the architect to identify the impact and risks of an addition of one or more new components.

Something of which (Foorthuis R. S., 2010) based on (Bucher, 2006) and (Capgemini, 2007) argues, "With their views on platforms, applications, processes and connections to other projects provide insight into project risks, allowing for timely risk prevention tactics. In addition, projects that conform to EA can benefit from the fact that issues at the enterprise-level have already been solved in the EA, thus mitigating risk and improving the chances of success, instead of building on sand." The usage of EA within projects thus eliminates or reduces project-associated risks and thereby increases the change of a successful implementation.

Leveraging the EA function of creating an overview in which the solutions needs to operate does not only enable the architect to manage the impact and its associated risks. Moreover it enables projects and thereby those who are part of the project team to manage complexity. (Foorthuis R. S., 2010) Based on (Ross J. W., 2006) and (Lankhorst, 2005) argues, "Analogous to controlling complexity at the organizational level, EA facilitates management of project complexity by using aspect areas, levels of abstraction, a modular approach, up-front decision making, and by standardized services, processes and systems. This should simplify project tasks, especially since certain issues should already have been resolved by the EA." Thereby the appliance of EA within a project enables the project to oversee and manage complexity.

Although it is argued that the usage of EA within projects enables the above advantages, less is written about the drawbacks of EA usage within projects. Nevertheless it could be argued that the process of implementing a certain solution by means of a project is "acquainted with abstract and non-practical EA prescriptions, dealing with additional stakeholders, balancing possible conflicts of interests and undergoing compliance assessments" and increases the complexity (Foorthuis R. , 2012). Furthermore is could be argued that the process of ensuring EA compliance during a project contrarily to saving resources, requires additional resources to EA to govern IT projects by means of compliance checks, advice, project architects, controlling architects and so on.

4.5 Conclusion

This chapter describes which techniques and resources are used when the organization decides to use EA within the context of this research. Moreover, this chapter answers the question (RQ4): Do these criteria affect the allocation of specific techniques and resources to IT projects, when the organization decides to govern an IT project by means of Enterprise Architecture?

To identify which resources and techniques with regard to EA are used in order to ensure project compliance, various methodologies with regard to EA have been discussed. It could be argued that the first means used with regard to EA is the PSA. The PSA is used by means of an architecture contract in which both the project organization and the architects agree upon the boundaries for a specific solution. Furthermore, the model (figure 19) developed by (Foorthuis R. , 2012) is used in order the processes in which EA is used as a means to govern IT projects while the project is carried out. These processes are; apply EA boundaries, provide advice on EA application, perform project action conforming to EA, add entry to EA feedback report, review baseline and manage EA. Multidisciplinary personnel are allocated to these processes. It could be argued that both architects and other stakeholders are needed to ensure that the IT project is carried out in compliance with the EA. The architect performs different activities to review the project and thereby uses EA as a means to govern IT projects. An important activity is carrying out compliance checks. These compliance checks can be can further be divided into four types: the correctness check, the justification check, the consistency check and the completeness check.

Besides carrying out these processes it could be argued that various other resources can be allocated in order to ensure compliance with the EA. Project architects and controlling architects can guide a project to ensure that the solution is implemented in compliance with the EA. The role of a project architect is delegated to an architect or a member of the project team. Besides a project architect, another role with regard to EA can be delegated to a project. This role is known as the controlling architect, in contrast to the project architect, the controlling architect is not an integral part of the project team. Furthermore it could be argued that the project manager also has a role in ensuring project compliance. After all, the project manager is accountable for delivering a solution within the boundaries as agreed upon in the PSA. In addition, an architecture board could be used as a means to govern an IT project and to ensure the projects compliance with the EA. The architecture board ideally consists of business management that represents the role of the client, the architecture management that represents the architect and the program manager who represents the project manager. In addition the executive management could complement the architecture board.

This chapter indicated that, "higher risk projects (or programs), will typically require more stability and therefore more rigorous control techniques." This statement already implicated that the risk associated with a particular project could be seen as a criterion to decide to use EA as a means to govern that particular project. Moreover, this statement implicates that the allocation of resources depends on this criterion. It could be possible that a high-risk project needs to be controlled by more resources and techniques. Furthermore, it became clear that smaller-scale projects need fewer resources with regard to EA. This implicates except from the fact that the scale of a project could be a criterion, that the amount of "control" is determined by this criterion. Moreover, this confirms that the criterion, scale of a project affect the allocation of specific techniques and resources to IT projects. Besides the scale of a project, it became clear that the impact of an IT project on a certain level of the EA determines the amount of control.

It could be argued that specific techniques and resources are allocated to IT projects based on the criteria, risk, impact and scale. These criteria determine the amount of resources that are allocated to a project in order to ensure compliance with the EA. Therefore it could be possible that organizations consider if the cost of those resources outweigh the benefits. Even when this is not the consideration, it could be argued that there at least need to be considered, if those resources outweigh for example the necessary "control". However, it cannot be argued that these criteria influence the decision whether or not EA is used as a means to govern IT projects. This needs to become clear within practice.

5. Qualitative research

5.1 Approach

This chapter describes how the qualitative study was designed and conducted in order to achieve a conclusive result. Although this has already been discussed in the introduction, this chapter will further elaborate on the qualitative research. Because the literature did not provide adequate answers for this research, field research is needed to gather enough information from practice. In addition, this enables the researcher to compare the conclusions from the literature review with that what has been found in practice.

The decisions made prior to the use of EA as a means to govern IT projects in practice should provide a better insight in the situations in which decisions with regard to EA are taken. The literature study will be used as a frame of reference in order to form a theory that is derived from the literature and practice. By using this approach, the results of the conclusions derived from the literature study function as a sort of hypotheses that can be weighed against that was is found in practice.

The necessary data is collected through interviews. The organizations and its respondents who took part in the interviews were selected based on EA usage in the context of this study. A list of more then a hundred Dutch firms was made. The organizations included within this list were selected based on the fact that they use EA as a preliminary framework that guides and constrains the development of IT projects. A further deviation was made in order to balance the amount of organization based on the background of these organizations. Then the right respondents selected based on the function they carry out. Eventually twenty-five interviews were held within twenty-two organizations within the public-, semi-public- and private sector.
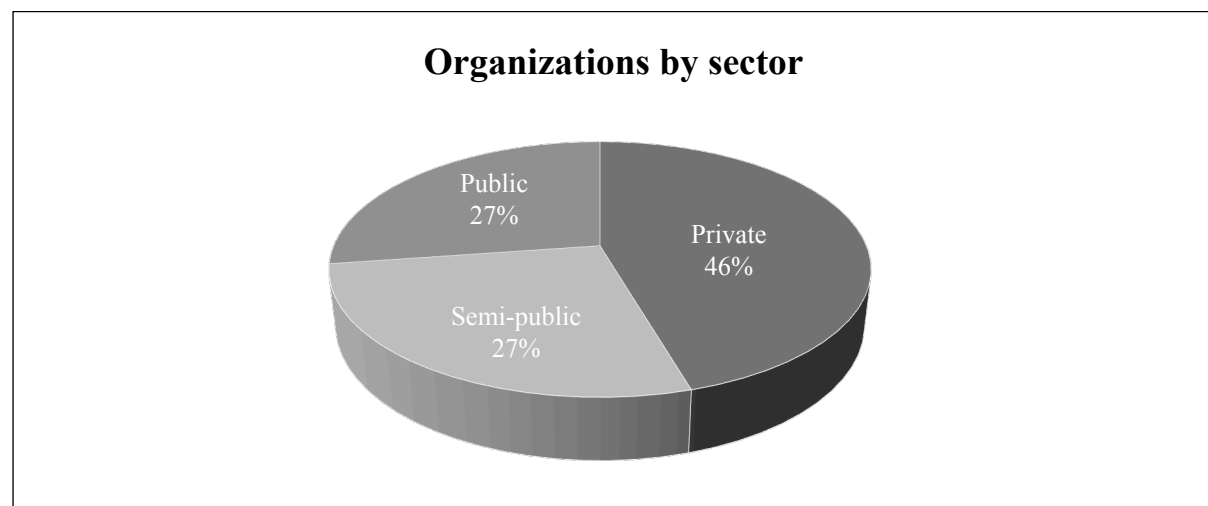
Figure 22: Research population by sector

The chart as visualized above, indicates that there is a good balance between the various sectors in which the interviews were held. The organizations that participated by means of interviews in the public sector are mainly government agencies and municipalities. Within the semi-public sector, primarily the staff of implementing agencies participated in this research. Within the private sector, especially banks, financial institutions and other types of service providers participated.

The interviews have been performed in a period of two months, the interviews lasted in most cases more than one hour. Because the interviews lasted for more than an hour, there were some questions beyond the scope of this study. Nevertheless the duration of the interviews enabled the researcher to examine the research topic into depth. The following organizations participated within this research.

Figure 23: Participating organizations

In order to be able to investigate the research problem from multiple positions within an organization, various respondents with a different job title are interviewed. The various roles of the interviewees within this research were CIO's, (lead) architects, business consultants, portfolio managers and other roles are directly related to EA from different points of interest. Eventually, a good mix of sectors, organizations and roles was established in order to create a good data collection. This not only increases the added value of this research, but also the reliability of the theory that will be constructed based on these interviews.
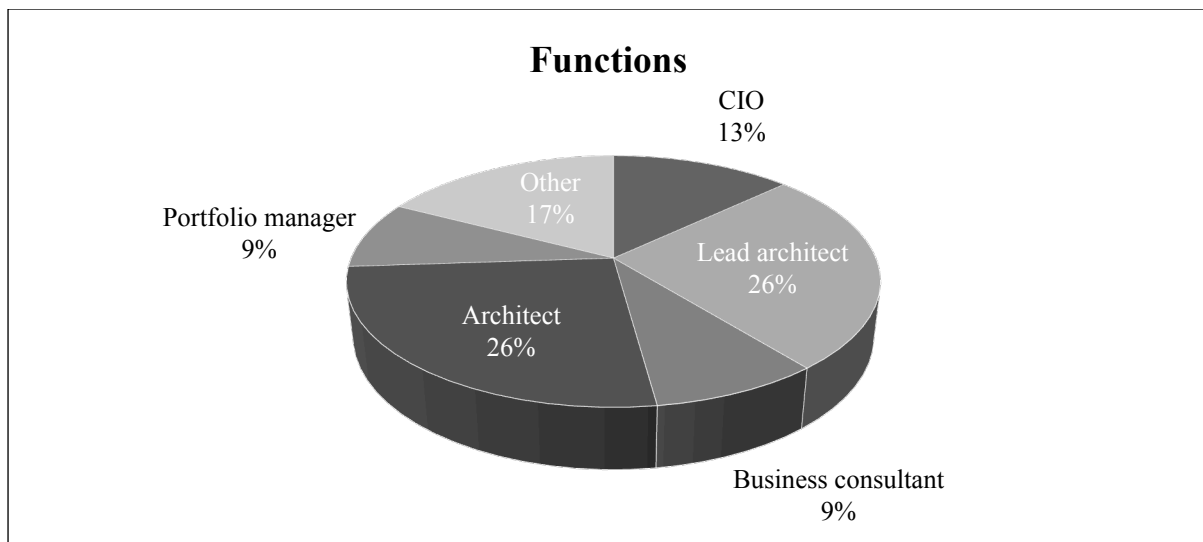

Figure 24: Research population by job title

5.2 Interview design

Interviews were used as a data collection method. These interviews are used in order to pursue in depth information with regard to the topic. Semi-structured interviews will be used in an attempt to obtain the opinions and thoughts of the interviewee, referred to as qualitative interviewing. Within these semi-structured interviews a consistent line of inquiry is needed although being too rigid needs to be avoided. Therefore a general interview guide approach is chosen, which consist of "the same general areas of information are collected from each interviewee; provides more focus but still allows a degree of freedom and adaptability in getting the information from the interviewee (Herbst, 2004)." In addition, the interview design is based on several pillars or artefacts that are present within the research model. These artefacts are:

- General facts;
- Drivers or drawbacks;
- Project initiation and planning;
- EA services;
- Decision-making;
- Criteria;
- Allocation of resources;
- Whether or not it contributes.

Figure 25: Interview design artefacts

This led to a list of interview questions, which is primarily based on the above topics. This list of question functions as the general interview guide, so there can be deviated upon when needed. By the use of this structure of artefacts the questions are build-up in a logical constructed manner. The questions are tailored to investigate the background, behaviours, opinions and knowledge. In which the background refers to standard background questions, behaviours refer to what a person has done or is doing, opinions refer to what a person thinks about the topic and knowledge refers to the facts about the topics.

5.3 Process and method

The processes and methods that were used in order to identify the substantive area of concern, collect data pertaining to the substantive area and the processing thereof is referred to as the "Grounded Theory" (Bitsch, 2005) (Gibson, 2009). The identification of the substantive area of concern has been done by means of the literature study. This has led to interview artefacts as described within the previous paragraph. The collection of data is done through the use of semi-structured interviews. As mentioned earlier, a list of possible respondents that consists of more then a hundred records was compiled.

These records consisted of contact information of contacts and clients of Verdonck Klooster and Associates, contacts of the Leiden University and contacts from the network of the researcher. Several contacts within this list were contacted to participate in this research. Eventually more the seventy-five per cent of the contacted contacts was willing to participate I this research. The interviews were recorded in order fall back on the recording when transcribing the interviews and in order to enable transcription. These interview transcripts are developed immediately after the interview to interpret the context as well as possible.

While developing the transcripts, the statements were immediately coded. The statements from fifteen interviews were used for open coding in order to determine the main- codes and concerns. After the main- codes and concerns were recognized the remaining interviews were coded selectively. For coding of the interviews use has been made of (Saldana, 2009). These coded statements have been processed based on a GUI-based manner, in which the statements are assigned to research questions, interview questions, multiple codes or tags, comments and organization in order to discover and label variables and their interrelationships.

After adding all of these statements and assigning them to a question, code, comment and organization, four hundred ninety six statements were processed. After reducing these statements in order to fit the purpose of this research a total of two hundred twenty one statements were used in order to form a theory. This led to a "statement database" in which the processed statements have been captured. Screenshots of this database can be seen within the appendix.

5.4 Chain of evidence

As described above, this qualitative research is based on the grounded theory. This grounded theory approach consists of a set of steps whose careful execution is thought to provide a good theory as the outcome. After the statements were processed and reduced the statements were sorted by research questions, interview questions, codes, comments and organization. This provides a better overview of the collected data and makes it better sortable. In addition, it may be considerably easier to analyze the collected data.

The concepts from the literature study were captured within the research model. Thereby the research model can be used in order to further investigate the coded statements. This enables the researcher to compare the concepts that were found within the literature study to those that were found in practice. However, first the relevant concepts must be derived from the statement database. The relevant concepts were derived from the statement database by multiple analyses based on the various subdivisions of the statements.

After the analysis of the various subdivisions of the statements, a conceptual model was made based on a root cause visualizations in order to frame various theories that answer the research questions from a practical point of view. This diagram consists of concepts and their relationships in a set of diagrams that reflects the explanation of the data, which can be seen as a theory. These theories can now be compared with the theory that was found within the literature study. The conceptual model can be found within the appendix.

Within the next chapter, both the theory from practice and the literature will be compared within answering the research questions. Because the literature study did not provided the necessary input to form a sound theory, the theories derived from the qualitative research will be primarily used in order to answer the research questions. These research questions will be used in order to provide insight into the context in which the decision to use EA as a means to govern IT projects is made. These research questions will be used in order to create a theory that answers the main question of this research. Finally, the main question will be answered and the possibility to develop a model that contributes to the decision to use EA as a means to govern IT projects is investigated.

6. Conclusion

6.1 Research questions and conclusions

Within this chapter the key research questions, which were stated in the introduction are answered. By weighing the outcomes of the literature study against the results of the qualitative study, this chapter provides answers to the research questions from a practical point of view. Furthermore the results of qualitative study can be seen as the foundation for forming a theory, supplemented by concepts from the literature study. This research is started in the assumption that organizations that use EA as a means to govern IT projects, have to allocate resources with regard to EA and this comes at a cost. Therefore an exploratory research was initiated to investigate the decision-making process prior to the use of EA as a means to govern IT projects. This led to the following main research question of this thesis:

> **MQ:** How do organizations decide whether or not an IT project needs to be governed by means of Enterprise Architecture?

To answer this main research question, the research is divided into four concepts, which are elaborated within the three main parts of this thesis, drivers and drawbacks, processes for initiating and planning, criteria- reasons and techniques and the allocation of specific resources. These four main concepts are discussed from a point of view in which EA is used as a means to govern IT projects. These concepts form the basis for the formation of the research questions. These concepts were studied using a systematic methodology based grounded theory method. In the following paragraphs the findings of the research are presented.

6.1.1 RQ1

The first research question is concerned with the drivers and drawbacks:

> **RQ1:** What drives or prevents organizations to govern IT projects by means of Enterprise Architecture, and do they influence decision-making?

Several interview questions were formulated in order to determine the drivers or drawbacks of using EA within the context of this research. The literature study concluded that there are several drivers for the use of EA as a means to govern IT projects. In practice it became clear that the rationale behind the drivers for applying EA as a means to govern their IT projects is especially dependent on organization specific circumstances. EA appeared to be a used as a means to act against several organizational challenges within several topics. These circumstances or challenges are in most of the cases based on the organizations intended strategic direction. In addition, these circumstances and challenges influence the type of driver for the use of EA within this context. Where the more market and competitive oriented organizations use EA in order to establish business and IT alignment and make IT add value to the business. The organizations that are more cost and operational oriented, use EA in order to avoid silos and duplication, cost control and better control of IT. The organizations that participated within this research focussed less on the drivers in order to manage IT projects such as the right projects, done right and supports decision-making on IT investments. Although the use of EA as a means to govern IT projects seems to be more associated with these drivers, the organizations in practice apply EA within this context to primarily to fulfil their strategic intend.

Drivers

- Other 5%
- Better control of IT 8%
- Reduce complexity 13%
- Supports decision making on IT investments 3%
- Cost control 24%
- Avoid silos and duplication 8%
- Make IT add value 16%
- The right projects, done right 5%
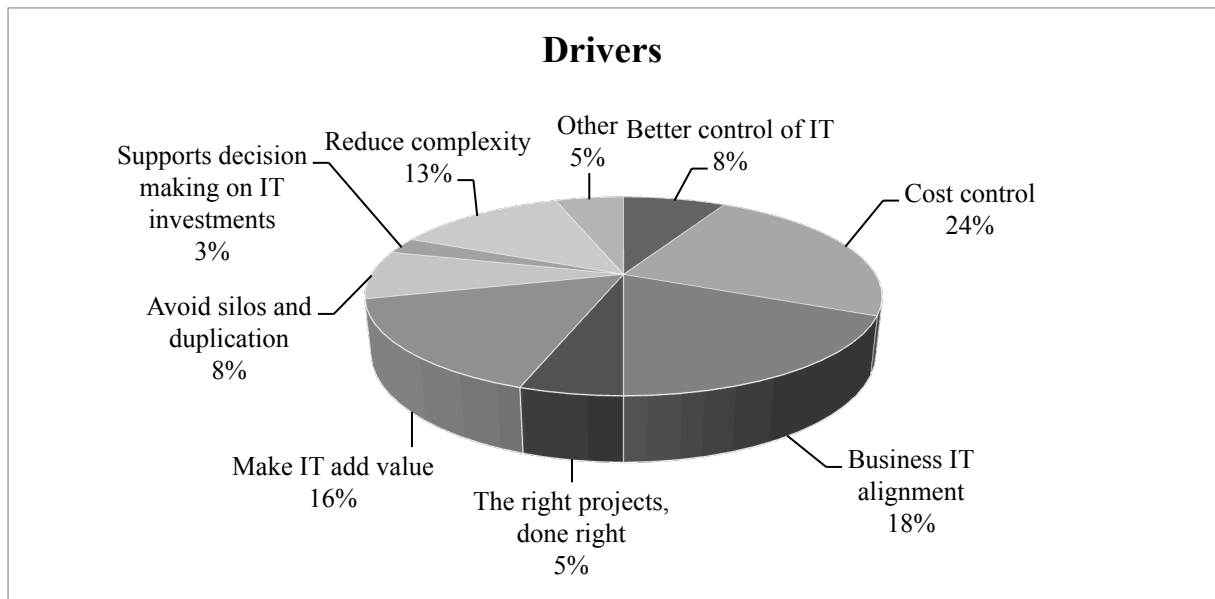- Business IT alignment 18%

Figure 26: Drivers in practice

Where EA is applied as a means to govern IT projects, it could be argued that the participating organization apply it in order to control costs, establish business and IT alignment and to make IT add value. The participating organizations that apply EA as a means to control costs, indicated primarily to do this order to consolidate, to avoid redundancy and to reduce the IT landscape. Nevertheless there were a few organizations that indicated that EA is also used as a means to develop IT projects in conjunction, which is accommodated within the variable "other". Only a couple of organizations indicated that EA was used as a means to enable decision-making on a project level. One might argue that the other organizations focus to less on applying EA as means to manage IT projects. Thereby, they are more focussed on the parent objectives and govern their IT projects from these objectives. Here is room for improvement because using EA as a means to govern or manage IT-projects enables the organization to reap the benefits associated with EA usage in this context.

The literature study concluded that, it could possibly be argued that the inverses of these drivers can be used as criteria on which the decision whether or not an IT project needs to be governed by means of EA could be based. In practice however it became clear that for example the inverse of complexity does not influence the decision whether or not EA is used as means to govern IT projects. Nevertheless it can be noted that as the administrative complexity increases, less projects are carried out in compliance with the EA. Furthermore the use of EA as a means is counteracted. However, no clear evidence was found that the inverses of the drivers influence decision-making.

The drawbacks of applying EA as a means to govern IT projects influence the decision whether or not to apply EA as a means to govern IT projects. In practice it became clear that these drawbacks are just as hard to find as in the literature. However it became clear that insufficiency and a to high level of description influences the decision to apply EA as a means to govern IT projects. "Our EA is not sufficient enough for some IT projects and we cannot provide relevant principles and guidelines to these projects." If the EA is not sufficient and cannot be used in order to guide and constrain an IT project, it could be argued that the project cannot be monitored for possible deviations. The same applies for a too high level of description of the principles and guidelines. Principles and guidelines that are described at a too high level, makes them insufficient and therefore provide no added value to a project and moreover difficult to govern.

6.1.2 RQ2

The second research question is concerned with the processes of initiating and planning IT projects:

> **RQ2:** Which processes are needed for initiating and planning IT projects in conjunction with the Enterprise Architecture and where in these processes is decided whether or not an IT project needs to be governed by means of Enterprise Architecture?

Several interview questions were formulated in order to determine how IT projects are initiated and planned in conjunction with the EA. These questions need to identify how EA is used within these processes and where the decision whether or not an IT project needs to be governed by means of EA is taken. The literature study enabled the development of a process model in which a project is initiated and planned. Conjunction with the EA is established by delivering services with regard to EA, to these various processes.

There could be several initiatives within an organization that lead to the initiation of an IT project. The literature study indicated that IT projects could be derived from opportunities, strategic planning, strategic information planning and the EA itself. In practice it became clear that these initiatives are actually used in order to determine which IT projects need to be carried out. However there are some processes in between initiation and the actual execution. Within practice a clear trend was noticeable that more and more organizations make use of strategic information planning.

Within the strategic planning process and the strategic information planning, the annual or multi-year projects are identified. It could be argued that especially the to-be EA delivers a valuable input towards the processes. "Ideally, the to-be EA is the basis for the strategic planning process, this planning process leads to the greater part of the possible projects that need to be carried out. The efforts to formulate the to-be EA are part of the strategic information planning." If EA is not involved within the information planning cycle and these plans are initiated within the business it is useful to assess this plan based on the EA before it is approved. In this case an enterprise architect conducts a review on which an advice towards the board or executive management is given. However not every organization applies strategic- or information planning in order to identify their needs, in addition not every organization uses EA within this process. Examples of this can be easily found within organizations that initiate IT related projects on a business level, instead of in conjunction with IT representatives.

Except from the fact that the to-be EA delivers a valuable input towards strategic planning, remarkably enough none of the interviewees indicated that the EA on its own, is an important means for the initiation of IT projects. Except from using the EA, the strategic- or information planning process, project initiatives also derive from opportunities. Within most of the organizations that use strategic- or information planning, a project initiative can only be submitted if it is actually an opportunity. Besides opportunities, threats such as regulatory compliance could occur. These opportunities and threats are often subjected to time constraints and this influences where in these processes is decided whether or not an IT project needs to be governed by means of EA. The organizations that are subjected to regulatory compliance try to anticipate to these changes, but if this is unsuccessful they decide under time pressure to not use EA as a means to govern the project. The same applies to opportunities that are subjected to time pressure. In this case the following phases of the initiation and planning process are left out and the project is carried out immediately without using EA as a means to govern the particular project.

After this first process in which ideas for new projects are established, the organization needs to concretize these ideas by means of business cases. The business case forms the basis for a project, in all of the participating organizations. Several interviewees indicated that these business cases are an important asset for the identification of a particular change. "Within the business case stage there are architects involved to deliver a provisional solution outline and to identify any problems at an early stage. In the business case, it is important that that various alternatives and scenarios are weighed on the basis of the EA. So the projects are especially weighed against principles and guidelines." In practice there were several variants found of EA contribution within this stage.
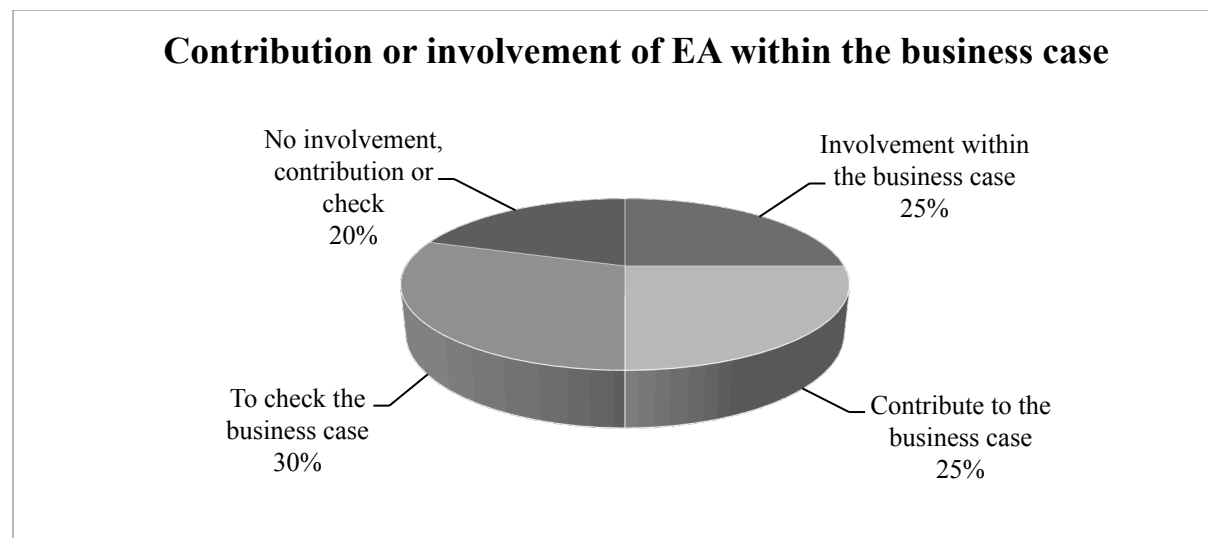

Figure 27: Contribution or involvement of EA within the business case

In practice, architects are to a lesser extent allocated to the process of initiating a business case. Only twenty five per cent of the participated organization assigns an architect to a business case team. Assigning an architect to the business case team equals the involvement of an architect within the business case. The architect is responsible for creating those parts of the business case that are related to EA. Contribution to the business case is in most of the cases delivering principles and guidelines and advice on which the business case team completes the business case, there is no further involvement of an architect. Contribution to the business case leads in most cases also to a check of the business case. This implicates that five per cent only uses an EA check in order to assess the business case. Within these tests ore assessments is tested how the project relates to the principles and guidelines. There can be concluded that those organizations that do not involve or let architects contribute to the business case, notice problems or any deviations from the EA in a later stage. Those who do not involve EA within the business case stage indicated that there is room for improvement. The eighty per cent that checks, contributes or are involved in the business case could at least notice insufficiency or time constraints within this process, because not every organization involves the EA function when possible IT projects are indicated.

After the business case is finished and approved it goes into the project portfolio, which is managed by project portfolio managers. Within practice EA plays an important role within portfolio management and vice versa. Portfolio management is for some of the respondents an important level of approval. Within this function, possible projects are primarily examined and prioritized on the strategic importance. However this function is by some of the respondents also used in order to assess the business case by performing the check on the business case as described above. If this is the case, there are architects assigned to the portfolio management process. Whether this is the case or not depends on the fact if architects are already assigned to the business case team.

Furthermore, portfolio management enables the possibility that "the possible projects can be assessed on a mutual impact among each other." Close cooperation between the EA function and portfolio management allows all possible projects to be centrally known. Thereby, "even the capacity of the architects could be taken into account." Another important function of portfolio management within some of the participating organization, is the fact that portfolio management is assigned to the task to monitor projects. Although this monitoring process is primarily focused on the implementation, it could be argued that close cooperation between the EA- and portfolio management function enables better insights on the projects that are not started yet, about to start and already have been started. However not every participating organization used their portfolio management function within the above described context.

The literature study indicated that after the project has been approved, there needs to be elaborated on the preliminary business case. It already became clear that the organizations in practice do not make a primarily business case, but a business case instead. The preliminary business case is in practice replaced by the business case. However after the project has been approved, the participating organizations carry out different subsequent steps of which it is difficult to get a grip on. It appeared that nowadays organizations do elaborate on the business case, but in order to establish a broad range of other documentation. For the purpose of this research we assume that all of these abbreviations are equal to a project initiation document (PID). According to the participating organizations, it is of great importance to involve EA in the previous processes. "Before the PID is made, EA plays an important role in order to initiate an IT project in conjunction with the EA. When we did not, solutions that did not fit within our EA were pushed by the business and abnormalities where noticed to late."

The PID functions as a document to elaborate on the business case. As the PID progresses, the possible solution that needs to be implemented by means of an IT project becomes more clear. Again EA services are provided to this process. In most cases EA related models, an advice and principles and guidelines are provided to the PID process. In some cases an architectural description is included within the PID, where others deliver EA based documentation in parallel. However, no unambiguous data is available to indicate the precise contribution of the EA function towards the PID process.

The literature study concluded that the decision whether or not to use EA as a means to govern IT projects is based on an impact and risk analysis. This risk and impact analysis should be based on the documentation delivered so far, produced by the processes as described above. In practice it became clear that the risk and impact analysis with regard to EA is performed. However, this risk and impact analysis is not so tangible as described within the literature study. In practice this risk and impact analysis is performed implicitly instead of explicit. It could be argued that this implicit analysis does not lead to a decision whether or not an IT project needs to be governed by means of EA. Instead this implicit analysis leads to a decision to allocate specific techniques and resources to IT projects.

However there remains a decision, whether or not an IT project needs to be governed by means of an IT project. If this decision is related to the decision within the DYA model describes, development without architecture, a specific project does not have to be developed in compliance with the EA. If, not a project does not need to be governed by means of EA while being carried out. This decision takes place within the processes before portfolio management, as the criteria insufficiency and time constraints can be noticed within these stages. To conclude two types of decisions were found within the participating organization. First, whether or not an IT projects needs to be developed in compliance with the EA. If not, no means with regard to EA are allocated in order to govern the project. If so, there will be made a decision to allocate specific resources and techniques within a later stage in parallel to the PID process.

6.1.3 RQ3

The third research question is concerned with the criteria, reasons and techniques:

> **RQ3:** Which criteria, reasons and techniques are used by organisations to assess and decide whether or not an IT project needs to be governed by means of Enterprise Architecture?

Most of the interview questions were formulated in order to determine the criteria, reasons and techniques are used by organisations to assess and decide whether or not an IT project needs to be governed by means of EA. This research was started in the assumption organizations must base there decision to apply EA as a means to govern IT project, on a cost-benefit consideration. Within practice it became clear that the participating organization do not base their decision on a cost benefit consideration. The interviewees indicated that it is too difficult to make a cost-benefit consideration for every particular project. Therefore it seems that organizations do not make a well-considered decision based on the question if the cost of applying EA as a means to govern an IT project outweigh the benefits.

If we relate the cost-benefit consideration to the two types of decision that were found in the qualitative study; the first decision, whether to comply with the EA or not is only taken based on the criteria: insufficiency and time constraints. However, the second decision whether or not to allocate specific resources can be seen as an implicit cost-benefit consideration. Nevertheless, this decision is based on other variables then costs and benefits. This decision is based on the used resources and techniques weighed against the desired amount of control. The participating organizations that make this consideration base the desired amount of control on multiple criteria. These criteria arise from the implicit risk and impact analysis. "This is an implicit decision that they make, based on a implicit risk and impact analysis on the known documentation and project artefacts until then."

This risk and impact analysis is used as a technique to determine the criteria is carried out implicitly and is according to some of the interviewees based on common sense, experience or "horse sense". "I base my risk and impact analysis on experience and as the impact and risk increases, I increase the amount of control for a particular project." "Based on personal interpretation we carry out an implicit impact and risk analysis." Furthermore there were several interviewees that used checklists based on a several criteria in order to classify IT projects. These organizations use this classification in order to determine the need for certain management documentation and the allocation of specific resources to a project. These checklists or classifications can also be viewed as a risk and impact analysis concerned with more then just EA considerations. However not every organization makes the consideration to allocate specific resources and techniques with regard to EA to an IT project.

Most of the interviewees indicated to allocate specific resources based on the implicit decision. Thereby, the compliance process deviates based on criteria that still have to be determined. It seems that the organizations that use one compliance process for all of their projects, view the costs associated with the resources used in order to ensure project compliance, as sunk costs. "We make very few exceptions on the EA compliance process, because the complexity within the organization asks for one recognisable process. In addition, we want to control the goals we pursue by the use of EA as a means." The same applies for those organizations that do not differentiate from their compliance process. These organizations make use of a predetermined set of controls in order to ensure project compliance within almost every project. Although they confirm that not every project is compliant with the EA, they make fewer exceptions within the first decision and do not differentiate based on the second decision.

Whether or not to allocate EA specific resources and techniques to IT projects

- Don't know 9%
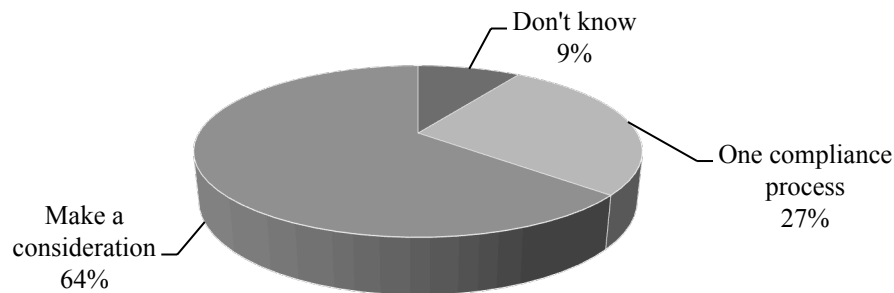- One compliance process 27%
- Make a consideration 64%

Figure 28: Whether or not to allocate EA specific resources and techniques to IT projects

Within the next paragraphs, the criteria found within the qualitative research are discussed. Therefore, first the criteria on which organizations decide whether or not an IT project needs to comply with the EA are discussed. The research until now already indicated that a project does not have to comply with the EA if it suffers from time constraints or due to the insufficiency of the EA and the corresponding principles and guidelines. The criterion time constraint applies according to the interviewees primarily to situations in which new legislation and regulation forces the organization to comply. The criterion insufficiency applies according to the interviewees to situations in which the current EA and corresponding principles do not provide any guidance or constraints to the particular IT project. "Although this not occurs very often, it remains possible." A temporary solution is another criterion that was found within the qualitative research and applies to this decision. "When the solution is temporary, using means with regard to EA will make the projects more expensive and lead to a longer lead-time and then it does not make sense to make use of EA." It can be argued that these three criteria can be identified within at least the business case- or portfolio management process if EA is involved. The lead architect in accordance with the client and portfolio management or the EA board takes the decision whether a particular project does not have to comply with the EA. If this is the case, a separate process is put in motion.

If a project does not meet the above criteria, the project must be carried out in compliance with the EA. Organizations then make use of resources with regard to EA in order to govern IT projects. However there has been proved, that this is done by a certain consideration. Therefore the various criteria on which the interviewees base this consideration are discussed. This is the second decision related to this research topic is whether or not to allocate specific resources and techniques to ensure the projects compliance with the EA. Within this decision organizations question their self, how many resources and techniques are needed in order to guide and constrain a particular project. At least sixty-four per cent of the interviewees indicated that this consideration is made. However this consideration of which we thought at first that it was a cost-benefit consideration, seems to be an implicit consideration based on experience. "Organizations do not considering whether the use of EA actually outweigh the costs, at least not consciously." The decision to allocate specific resources and techniques to an IT project is based on the following criteria:

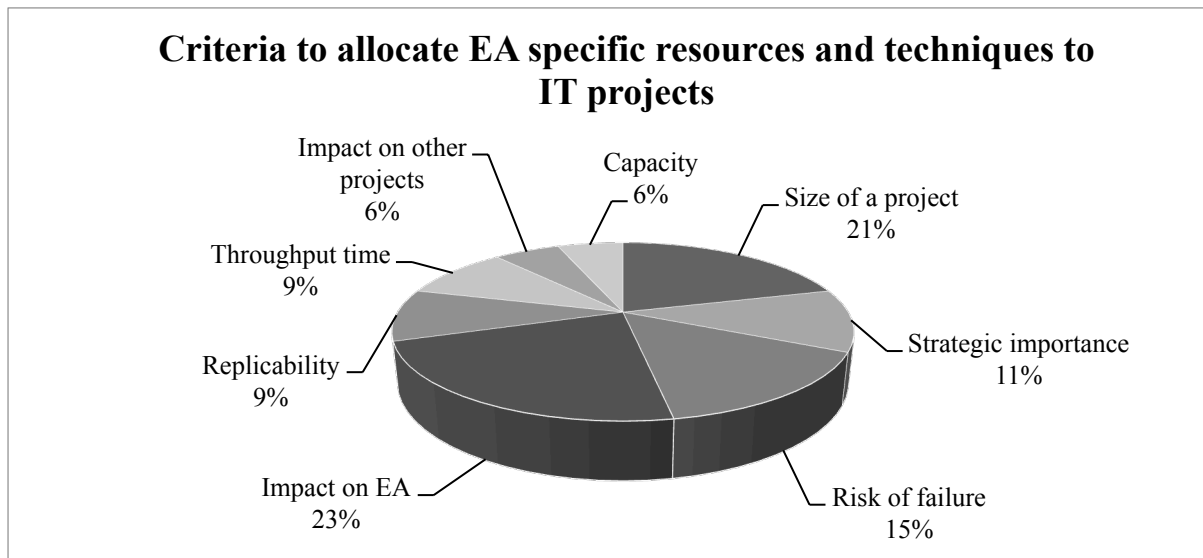**Criteria to allocate EA specific resources and techniques to IT projects**

Figure 29: Criteria to allocate EA specific resources and techniques to IT projects

The literature study already indicated that the risk, scale and impact on the EA could be criteria on which specific resources and techniques are allocated. Within practice these three are the most frequently cited criteria. However the qualitative study indicated that there this decision is based on a broader range of criteria.

The impact of a specific project on the EA is an important criterion according to literature and the interviewees. The impact of a particular solution implemented by means of an IT project is measured throughout the various layers of the EA. In addition the amount of principles and guidelines to which the project could be related, needs to be taken into account. If a particular solution is relatively "stand alone" solution and is not related to many principles and components within the EA can be seen as a solution with a low impact. The second most cited criterion is the size of a project. The interviewees characterize the size of a project by the money that is involved with the solution and the implementation of it. Furthermore the interviewees characterize the size of a project by the number of project members. In addition it can be argued that the size of a project depends on the organization and is influenced by the amount of users, employees and geographical distribution. Thereby the size of a project is associated with the complexity of particular project.

The interviewees characterize the risk of failure as the level of probability that the IT project will fail. In addition the consequences of possible failure are taken into account, for instance the consequences that the failure of an IT project has on the continuity of the business. The criterion strategic importance is characterized by the extent to which the project contributes to the achievement of the strategic goals. The criterion replicability is characterized by the degree to which similar projects have already been carried out. In addition, references for these projects must be present and available in order to guide the project. The throughput time of an IT project can be measured by the time that it takes to finish the project. "The project will be delayed, if too many means with regard to EA were allocated to a project that only takes two months to finish."

Two other criteria that are not frequently cited, but could influence the decision to allocate specific resources and techniques are the capacity and the impact on other projects. "I cannot assign an architect or deliver architectural services to every project." The capacity of architects can be seen as a criterion, on the other hand this criterion affects the degree to which the decision to allocate specific resources and techniques is taken. The lower the capacity, the more frequent this decision is taken.

The last criterion is the impact of a certain project on other projects that are carried out or about to start. The probability in which two or more projects get into a conflict of interest determines the level of commitment of the EA function. If multiple projects are operating on the same common ground, this can be harmful to both projects and even to the organization. The overlap between the projects increases the complexity and the degree of failure. Although this is not one of the most frequently cited criteria, the criterion impact on other projects should certainly be taken into account. Based on these criteria a deliberate decision is made which projects are governed by certain means with regard to EA.

Only within a few organizations is noted that these consideration where some how formalized within project classifications in which other topics where involved as well. However by classifying the projects within the stage of portfolio management, the EA functions knows which resources need to be allocated in advance. Furthermore these organizations had a clear overview of the projects that where about to start and knew in advance which project are conform the EA and which where not. The decision to allocate specific techniques and resources to IT projects is in most cases taken by the lead architect or executive management responsible for a department in which architects operate. Within multiple organizations the decision is taken based on the developments so far and the consequences that EA has for the project in terms of resources and techniques are fed back to the project organization or the client.

6.1.4 RQ4

The fourth research question is concerned the with the allocation of specific techniques and resources:

> **RQ4:** Do these criteria affect the allocation of specific techniques and resources to IT projects, when the organization decides to govern an IT project by means of Enterprise Architecture?

Known is that several criteria influence the allocation of resources and techniques, however the question is still how these criteria influence this decision. Within the next paragraphs, the criteria found within the qualitative research are related to the resources and techniques that the participating organizations allocate to IT projects.

The means with regard to EA referred to as resources and techniques that are used in practice are almost similar to those that were found within the literature study. Depending on the organization and the capacity, one uses more resources and techniques then the other. Furthermore, it was noticed that the terminology relating to these resources and techniques is ambiguous. For the purpose of this research is assumed that means such as a PSA and various compliance checks, project architects, controlling architects, an architecture board and other tasks are used as resources and techniques. This set of controls forms the compliance process in organizations that do not make a consideration. However for those who make this consideration this set of controls is not predetermined. The resources and techniques that are used are equal to the desired degree of control. The same applies for IT projects, where the desired amount of control is determined by a consideration based on the criteria. "We look for a balance between extra ballast and what it adds to a project."

Where the processes upfront of the project start in which EA is involved can be seen as the initiation and planning in conjunction, the PSA is seen as the first means with regard to EA in order to govern an IT project. In practice became clear that the criteria influence the form in which the PSA needs to be realized. Multiple types of PSA's were discovered that are related to the criteria.

The qualitative research indicated that the desired amount of control results in three types of PSA's:

- ▪ Notification of intent
- ▪ Limited PSA
- ▪ Comprehensive PSA

Figure 30: Types of PSA's

The notification of intent is the most limited form of a PSA and is characterized by less guidelines and constraints. This notification of intent is not commonly used by the participating organization and is only subjected to those projects that have a low score on the criteria: impact on EA, size of a project, throughput time, risk of failure and a high degree of replicability. The limited PSA is by some of the interviewees incorporated in a template. This standard template proves the existence of this consideration. The interviewees that did not possess such a template indicated that the extent of the PSA is subjected to the size of a project in terms of deliverables. "Resources and techniques with regard to EA are only applied when they are actually needed, it is useless to write an PSA of more then thirty pages for a medium sized project." It seems that the extent of the PSA is primarily related to the size of a project. Additionally, the size of the PSA is subjected to the other criteria as well. It can be argued that a project that has a large impact on the EA is concerned with more principles and guidelines and thereby needs more mutual agreements. A comprehensive PSA is equal to a high level of control, desired by the EA function. IT projects that score high on the various criteria are subjected to a comprehensive PSA. "All projects of relevance must have a PSA in which also the impact of the project on the whole EA is described."

The use of controlling architects in order to monitor and give advice to a project is the most cited resource with regard to EA. In practice this resource can be allocated in two different ways. Organizations that have a sufficient capacity of architects assign their architects to several projects and provide them with an indication, which project needs to be governed more than the others. Organizations that have an insufficient capacity only assign architects to those projects that score high on the basis of the criteria. The architects are primarily assigned to projects that have a high degree of strategic importance, risk of failure and the impact on the EA. "I assign architects to projects that have a high risk and strategic importance. In critical projects with a high impact, architects are assigned as controlling architect in order to advice and supervise." Another criterion that impacts the decision to allocate a controlling architect is the low level of replicability. If the project has a low replicability the most experienced architect on that particular topic is assigned to the project. Again the degree of control based on the criteria determines whether or not a resource in the form of a controlling architect is assigned to a project. Furthermore it became clear that the role of a controlling architect is well suited to participate within a steering committee.

These controlling architects are responsible for the compliance checks in which the project artefacts are tested against the guidelines, principles and the agreements made within the PSA. The degree to which the controlling architect performs these checks is equal to the needed amount of control derived from the criteria. In practice it became clear that these checks are not based on the types of compliance checks identified within the literature study. However, tests are performed on the basis of the baseline as included within the PSA and the principles and guidelines. Within the projects that are less governed by means of EA the compliance check is often performed at the end of the project. If there is no controlling architect assigned to the project the results need to be delivered by the project team itself. Furthermore it was noticed that the interviewees indicated that the project manager is made responsible for ensuring compliance in cases that no controlling architect is assigned.

The project manager is expected to fulfil the role of a project architect in case that a controlling architect is not assigned to the project. It could be argued that low impact IT projects are not controlled by means of a controlling architect however these projects still have to comply with the EA. Therefore, more is expected from a nowadays project manager. The project manager is not expected to only take into account the time and resources, but also needs to take into account the development of the project within the boundaries of the EA. "We try to ensure that the project manager itself signals deviation from architecture, this is a step that slowly but surely finds hearing." "If the project manager deviates from the baseline it is his task to signal this and needs to escalate towards the EA function." This escalation path can be formed by means of an architecture board.

It is the task of the architecture board to control the EA processes within the context of this research from the initiation of a project until the project is finished. Except from the fact that they control these processes it functions as an escalation path for each activity in which EA is involved. It could be argued that escalation is only needed when a problem or deviation occurs and the problem cannot be solved on a project level. However no clear evidence regarding the role and the variety of the architecture board was found within the qualitative study. The same applies for the allocation of a project architect. The use of a project architect as indicated within the literature study is a less frequently cited resource within the qualitative research. Thereby it can be argued that the project architect is not used within every organization. It remains unclear if the participating organizations use this role as an equivalent of the controlling architect. As a result, no conclusions can be drafted about the use of an architecture board and a project architect and whether the use of these means is influenced by the criteria.

6.1.5 MQ

The main question is answered based on the previous research questions:

> **MQ:** How do organizations decide whether or not an IT project needs to be governed by means of Enterprise Architecture?

This research is started in the assumption that organizations make a cost-benefit consideration if the costs of applying EA as a means to govern IT project outweigh the benefits. In addition, it can be argued that means such as delivering EA services, assigning architects and using EA related documentation are an extra ballast on the existing project organization an this comes at a cost. However it became clear that there are two types of decisions made. First organizations assess and decide if an IT project needs to be developed in compliance with the EA. This decision determines whether or not means with regard to EA are used in order to govern a particular IT project. If an IT project does not have to comply with the EA, no means with regard to EA are needed to guide and constraint the project. This decision is based on few criteria that force the organization to divert from the process of initiating and planning an IT project in conjunction with the EA and thereby also deviates form the compliance process. If an IT project has to be developed and carried out in compliance with the EA, a second decision is made in which organizations make an implicit consideration that is not based on the costs and benefits. Organizations do not consider whether the use of EA actually outweigh the costs, at least not consciously. However it could be argued that this decision is reminiscent to a cost-benefit consideration. Instead organizations take a decision that is based on the balance between extra ballast and what it adds to a project In addition, the used resources and techniques are weighed against the desired amount of control. It is within this second decision that organizations make a decision on how many means with regard to EA are needed in order to guide and constraint the a particular IT project.

These two decisions are made within the process of initiating and planning an IT project in conjunction with the EA. In elaborating on this process, the primer focus is on those sub-processes in which EA is involved. The first sub-process is the process in which the possible project initiatives are identified is referred to as the strategic planning process. This process tends to differ varies by organization, however most of the participating organizations make use of strategic planning or strategic information planning in order to determine their project initiatives in accordance to the strategic goals. Remarkably enough none of the interviewees indicated that the EA on its own is an important means for the initiation of IT projects. However, within the strategic planning- or information planning process EA can be seen as a valuable source of input. If EA is not involved within the process it could be argued that an enterprise architect needs to perform a review on these plans. Based on this review advice towards the board or executive management is given. Furthermore project initiatives could derive from opportunities and threats. These opportunities and threats can be recognized within the strategic planning process or in parallel to this process.

In order to concretize the possible initiatives that could be carried out by means of IT projects, business cases are made in order to justify the investment. It is within this process that the possible basis for a solution becomes partially clear. Within the literature study was indicated that, EA is involved in the preparation of the business case it could be argued that an architect is needed to at least deliver input to the business case, if he is not already assigned to assess the business case. In practice, it became clear that EA could be involved within the business in three different ways. Architects can participate or be involved in establishing the business case and could assess the business case in order to give an approval or an advice. If architects are involved, they primarily deliver principles, guidelines and advice related to the scope of the intended change. In most cases of EA involvement the business case is assessed as well in order to give an approval or an advice. By involvement of EA within this process, the EA function has an input to the possible provisional solution outline and thereby could identify any problems at an early stage.

The first decision in which organizations assess and decide if an IT project needs to be developed in compliance with the EA, is a rarely reported decision. This decision equals the decisions as identified within the literature study, captured within the DYA model. Within this research it became clear that time constraints are not the only criterion on which this decision is based. In addition this decision is based on the criteria insufficiency and temporary solutions. The criterion insufficiency applies for those project initiatives for which the principles and guidelines derived form the EA don not apply. Insufficiency arises from an insufficient EA, which does not provide any guidance for the intended change. In addition insufficiency arises from a to high level of description with regard to the guidelines and principles. Thereby the EA becomes not sufficient enough for some IT projects and we cannot provide relevant principles and guidelines to these projects. The criterion temporary solution applies to those project initiatives that are carried out in order to establish temporary solutions. Temporary solutions can be seen as initiative that fulfils for instance a request for a temporary information exchange within the supply chain. Another example is a temporary that brings forth a change in order to comply with legislation and regulation. In this case the criterion time constraints applies as well. The criterion time constraints, applies to those project initiatives that derive from an opportunity or threat and needs to be carried out as soon as possible. In this case an opportunity that could establish a temporary competitive advantage, is exempt from compliance with the EA. If it is a reaction to a competitor and a quick reaction is needed, it can be seen as a threat. Furthermore the need for a quick reaction to comply with legislation and regulation can be seen as a threat as well. This decision based on these criteria is only made in highly exceptional cases.

It could be argued that these criteria could at least be noticed within the process of establishing the business case, if it has not already been noticed within the strategic planning process. Even when projects are initiated from opportunities and threats in parallel to the strategic planning process, approval and funding is needed in order to start a project. A business case in what form so ever is at least needed to justify this project initiative. This could be another important reason to incorporate the EA function within overall project approval process. As a result, the decision to develop a project that does not adhere to the EA can be made by mutual agreement among those who fund the project, those who need the particular change and the EA function. The literature study indicated that this decision is made after the strategic dialogue, which refers to the entire process of initiating and planning an IT project in conjunction with the EA. Nevertheless the results from the qualitative research implicate that this decision is made within the strategic planning process or the business case process. However it is important the EA function is involved within these processes. If the EA function is not involved within these processes, solutions that do not comply with the EA cannot be identified and controlled. In addition abnormalities that could impact the EA are noticed to late.

If the previous decision is not frequently taken, the vast majority of the project initiatives need to be developed in compliance with the EA. These project initiatives are prioritized within the portfolio management process. Prioritizing of these projects is primarily based on the fulfilment of the organization strategic intend in which EA could support. During the intake of the projects, the business case can be assessed on the possible intend and whether this is in compliance with the EA. This is primarily done by those organizations that use an EA assessment on the business case. Where architects are already involved within the business case process, the architects include an architectural advice. Furthermore the interaction between the portfolio management function and the EA function is an important asset in order to get a good overview and to control those projects that are not started yet, about to start and already have been started. Furthermore the possible projects can be assessed on a mutual impact among each other. In addition, the needed capacity of architects within the subsequent processes can be identified. If the organizations make use of portfolio management it is within this process that is decided to carry out a particular project initiative.

After the project initiative is approved the initiation and planning continuous within the process of elaborating on the business case. Within this process it became clear that organizations use a broad range abbreviations in order to establish documentation that refers to documenting the initiation and planning of a project. Thereby most of the interviewees referred to this documentation as the PID. As the PID progresses, the possible solution that needs to be implemented by means of an IT project becomes more clear. Again EA services are provided to this process. In most cases EA related models, an advice and principles and guidelines are provided to the PID process. In some cases an architectural description is included within the PID, where others deliver EA based documentation in parallel.

Instead of what was concluded within the literature study the risk and impact analysis is carried out implicitly and is according to some of the interviewees based on common sense, experience or "horse sense". The risk and impact analysis is carried on the basis of personal interpretation and leads to the decision, which resources and techniques are used in order to guide and constrain the project. This is the second decision that organizations make with regard to the use of EA as a mean to govern IT projects. This decision is based on the question how much resources and techniques with regard to EA are needed in order to implement a specific solution in compliance with the EA. It is within this decision that (lead) architects together with the stakeholders, make a decision on how many means with regard to EA are needed in order to guide and constrain the project.

This decision is based on the implicit risk an impact analysis carried out on the basis of the project documentation and artefacts made so far. Within this risk and impact analysis, architects make their judgement based on several criteria. The criteria impact on the EA, size of a project, risk of failure, strategic importance, replicability, throughput time, capacity and impact on other projects are used in order to make the decision.

The impact of a particular solution implemented by means of an IT project is measured throughout the various layers of the EA. If a particular solution affects multiple components and is related to a high degree of principles and guidelines, it can be seen as a solution that has a high impact on the EA. The second criterion is the size of a project characterized by the number- of project members, users, employees and geographical distribution. Thereby the size of a project is associated with the complexity of particular project. The risk of failure is the level of probability that the IT project will fail. In addition the consequences of possible failure are taken into account, for instance the consequences that the failure of an IT project has on the continuity of the business. The criterion strategic importance is characterized by the extent to which the project contributes to the achievement of the strategic goals. The criterion replicability is characterized by the degree to which similar projects have already been carried out. In addition, references for these projects must be present and available in order to guide the project. The throughput time of an IT project can be measured by the time that it takes to finish the project. The capacity of architects can be seen as a criterion for organizations that do not have enough capacity. The last criterion is the impact on other projects is the probability that two or more projects get into a conflict of interest.

Based on these criteria the needed resources and techniques for a particular project are determined. This can be seen as an input towards the documentation in which is determined which resources and techniques are used. Based on an assessment on the criteria, various resources and techniques are allocated to the project. If these criteria are related to the technique of making and approving a PSA, three types of a PSA were found: the notification of intent, a limited PSA and a comprehensive PSA. The project needs to make one of these types of a PSA, depending on the various criteria. The technique of using compliance checks in order to monitor the compliance of a certain project with the EA depends on the use of controlling architects. These controlling architects are responsible for the compliance checks in which the project artefacts are tested against the guidelines, principles and the agreements made within the PSA. However the use of these controlling architects depends on the criteria as well. Organizations allocate controlling architects to the most critical projects, which in a high degree comply with the criteria. Projects that comply with the criteria in a low degree are not assigned to a controlling architect, but ensuring compliance becomes the responsibility of the project manager. The project manager is not expected to only take into account the time and resources, but also needs to take into account the development of the project within the boundaries of the EA.

To conclude, the participating organizations indicate that development in compliance with the EA is the standard. An exception to develop a project that is not compliant with the EA is based on time constraints, insufficiency and a temporary solution. This is the first decision with regard to the use of EA as means to govern IT projects. If the project needs to be carried out in compliance with the EA, a second decision is made within the process of initiating and planning a project in conjunction with the EA. Within this decision the organizations decide how much resources and techniques with regard to EA are needed in order to implement a specific solution in compliance with the EA. This decision is enabled by an implicit risk and impact analysis based on several criteria. These criteria influence which resources and techniques will be allocated to a specific IT project. The following model reflects the processes in which EA in used in order to initiate and plan an IT project in conjunction with the EA. In addition, the two decisions are incorporated.
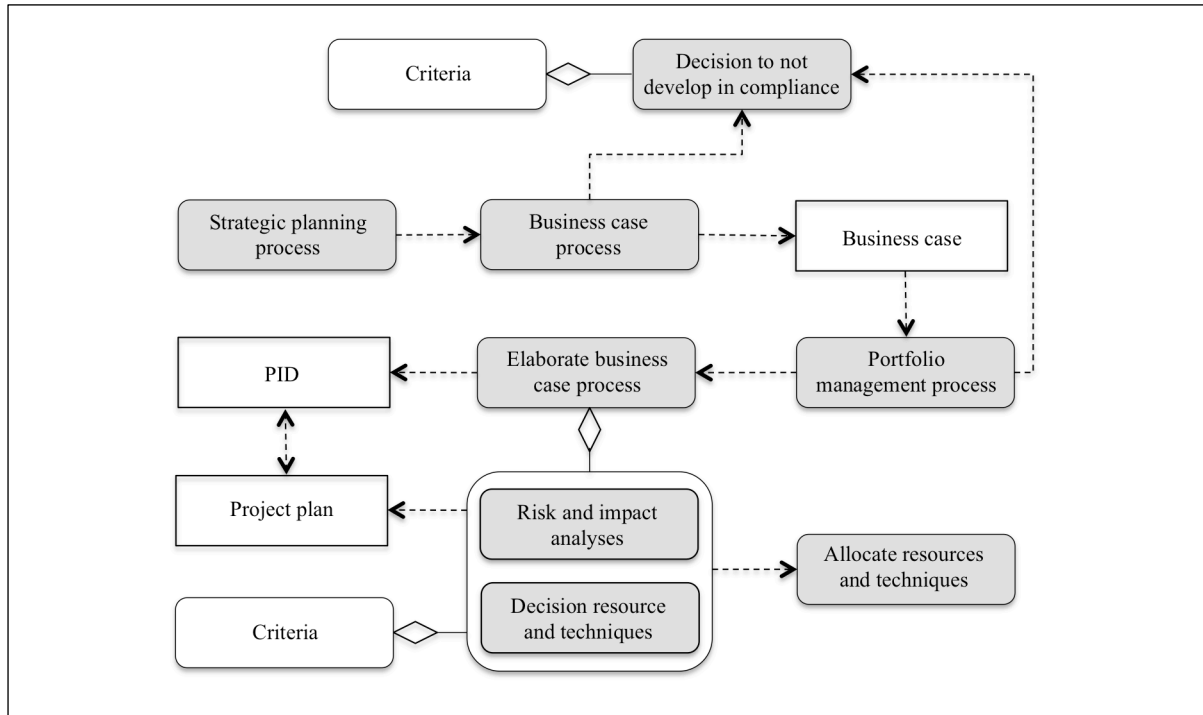
Figure 31: Initiating and planning in conjunction with EA

6.1.6 Model RQ5

The fifth research question investigates the possibility to develop a model that contributes to the decisions.

RQ5: Is there a possibility to develop a model that contributes to the decision whether or not IT projects have to be governed by means of Enterprise Architecture?

Two decisions with regard to EA as a means to govern IT projects were found. The first decision whether or not an IT project needs to be developed in compliance with the EA is taken to a lesser extent. An exception to develop a project that is not compliant with the EA is based on time constraints, insufficiency and a temporary solution. It could be argued that a project that does not comply with the EA does not have to be initiated and planned in conjunction with the EA.

A second decision is made later within the process of initiating and planning an IT project in conjunction with the EA. This decision is taken based on the question how many resources and techniques are needed in order to ensure that the project develops a solution that is in compliance with the EA. This decision is based on several criteria, impact on the EA, size of a project, risk of failure, strategic importance, replicability, throughput time, capacity and impact on other projects. However the criterion capacity only determines the degree in which this decision is taken. Within the research it became clear that the extent to which the project meets these criteria determines the degree of control. Various configurations with the extent to which organizations decide to govern an IT project, were found. This enables this research to capture the criteria within a model and to relate the criteria to various configurations. The decision to allocate specific resources and techniques is captured within a multi criteria model in order to to provide insight into this implicit. If there is no good reason to develop a project that is not in compliance with the EA, the projects will be initiated and planned in conjunction with the EA. By delivering services with regard to EA to the various stages of this process, the architects gets a good understanding of what these projects are planning to develop.

It is based on this good understanding that the EA function decides to allocate specific resource to a particular project. Therefore this model only applies to those organizations that use EA within the various stages of initiating and planning an IT project. It is this decision of which was thought that it was a cost-benefit consideration, instead the resources and techniques are weighed against the desired amount of control. Various interviewees indicated that the needed amount of control is based on these criteria. The implicit decision and criteria are captured within the following multi criteria model in order to make this decision more explicit and tangible.

EA AS A MEANS TO GOVERN IT PROJECTS		1	2	3	4	5
IMPACT ON EA	Does the project impact the business or its processes?					
	Does the project impact the existing applications?					
	Does the project impact the existing infrastructure?					
IMPACT ON OTHER PROJECTS	Does the project impact other projects?					
		Low impact ⟵————⟶ High impact				
SCALE	What is the scale of the project?					
THROUGHPUT TIME	What is the throughput time of the project?					
		Small ⟵————⟶ Large				
STRATEGIC IMPORTANCE	To how many strategic goals does the project contribute?					
		None ⟵————⟶ Many				
RISK OF FAILURE	What is the chance of failure and does it affect continuity?					
		Low ⟵————⟶ High				
REPLICABILITY	Have we already performed a similar project?					
	Is there a reference available for this project?					
		Many ⟵————⟶ None				
SCALE:	1-12 MINOR	13-31 MEDIOR			32-50 MAJOR	

Figure 32: Decision-making model

The decision making model contributes to decision that determines how a particular project needs to be governed by means with regard to EA. The various criteria found within the qualitative research are used to make a generic model. By relating those criteria to the specific resources and techniques that where used, three types of classifications where found. These classifications where determined by using the interview data of those organizations that formalize their classification supplemented by the data of a few other organizations with a high EA maturity level. The results from the interviews where normalized to a scale of hundred. In addition, there has been studied how often a particular configuration occurs. As a result, the category minor seems to be applied less often then the other two. This configuration is only used within exceptional cases and occurred on a .24 scale. The other two configurations that were found occur in almost the same extent and therefore the remaining scales were divided by two and applied as a .38 scale for both configurations. Based on these classifications EA is used as a means to govern IT project in three different ways.

Minor IT projects: IT projects within the minor category are governed by a relatively low amount of resources and techniques with regard to EA. It could be argued that these projects are characterized by smaller changes that score low against the criteria. Therefore these projects are subjected to a lower amount of control by the EA function. The PSA is within this configuration replaced by a notification of intent. Agreements are made based on the principles and guidelines. However the notification of intent is characterized by less guidelines and constraints. Instead of a controlling architect a project manager becomes responsible for ensuring the compliance of the project to the EA. The project manager is not expected to only take into account the time and resources, but also needs to take into account the development of the project within the boundaries of the EA. It is also the task of the project manager to inform the EA function about the progress of the various project artefacts. Furthermore, it is the task of the project manager to inform the EA function about the final results of the projects. A typical project that could be placed within this category is the implementation of a relatively "stand alone" solution that does not impact the EA, is small in scale and throughput time, is replicable and has a low risk of failure.

Medior IT projects: Within this category, resources and techniques with regard to EA are applied in order to establish a medium level of control. This category can be characterized as the generic manner in which organization apply EA in order to govern IT projects. It is within this configuration that the extent to which the PSA is written depends on the project specific characteristics, which is referred to as a limited PSA. The term limited should not be taken too literally and size increases. As for example the project relates to more principles and guidelines. In addition, this PSA consist of the normal template, filled in to a lesser extent. The PSA consist of agreements that are made based on the models, principles and guidelines. The role of controlling architect is assigned to an architect that monitors the project on its compliance with the EA, but not on a regular basis. The project artefacts are tested against the baseline, principles and guidelines by means of compliance checks to a lesser extent. In addition, the architect delivers the by the project needed architectural services and can be consulted for an advice. The projects that belong to this category could be characterized as projects that need to be subjected to a general amount of control. The controlling architect could be assigned to multiple medior projects.

Major IT projects: Within this category, resources and techniques with regard to EA are applied in a more rigorous extent. The projects that belong to this category could be characterized as projects that need to be subjected to a higher degree of control. IT projects that score high on the various criteria are subjected to a comprehensive PSA. The comprehensive PSA requires a more detailed description of the models, principles and guidelines. The same applies for the agreements that need to ensure the compliance between the project and the EA. The controlling architect assigned to these types of projects is in a higher degree involved and performs compliance checks on a regular basis. The controlling architect assigned to these types of projects is often an architect that has more experience with the type of solution that is implemented. Where the controlling architect can be assigned to multiple medior projects, the controlling architect of a major IT project is permanently assigned. Within some organizations the controlling architect fulfils a more participating role if a particular project scores high against the criteria. In addition, more detailed services such as architectural models and advices are delivered to the project.

6.2 Discussion

This research is started in the assumption that organizations make a cost-benefit consideration if the costs of applying EA as a means to govern IT project outweigh the benefits. However it became clear that organizations do not make such a consideration, at least not explicit. In practice it became clear that there are two types of decisions made. Within the first decision organizations assess and decide if an IT project needs to be developed in compliance with the EA. This decision equals the decisions as identified within the literature study, captured within the DYA model. However within this research it became clear that time constraints is not the only criterion on which this decision is based. In addition, this decision is based on the criteria insufficiency of the EA and the durability of the solution. Furthermore it became clear that this decision equals the decision to not use EA as a means to govern an IT project. Moreover this decision is not taken based on the elaborated business case or project plan, but can be taken in an earlier stage of the initiation and planning phase.

If the organization makes the decision that an IT project needs to be developed in compliance with the EA, a second decision is taken. Within the initiation and planning of an IT project there is also decided how much means with regard to EA are needed in order to ensure that the project develops a solution that is in compliance with the EA. This decision is not sufficiently described within the existing literature. Instead the existing literature is focussed on developing even more means with regard to EA. It could be argued that applying too many means with regard to EA is additional ballast to the existing project organization and thereby creates affection to the use of EA. Therefore organizations make a consideration in which the resources and techniques are weighed against the desired amount of control. Eventually this led to the construction of a multi criteria model in which this decision is captured.

The data is collected by means of semi-structured interviews in order to answer the research questions from a practical point of view. A risk of applying semi-structured interviews is that there can be deviated from the line of questioning. Despite the fact that it was known, it has occurred several times. There were situations in which the interviews could have been better controlled. Another point of critique is the terminology used with regard to EA. Due to the lack of uniformity it was sometimes difficult to interpret the statements properly. In addition, the terminology with regard to EA and governance is so ambiguous that it hampers the research within this area of concern. This also had its effect on this study and thereby became unnecessarily complex. The call for more uniformity was there already years ago, only it has not yet been heard.

Eventually twenty-five interviews were conducted within twenty-two organizations that apply EA as a means to govern IT projects. Although these organizations differ in their approaches, used terminology and the maturity level of applying EA, results have been justified by the use of the grounded theory. In practice it became clear that some organizations properly apply EA in the process of carrying out an IT project, but did not apply EA within the planning and initiation process and vice versa. This indicates that there is still room for improvement. By developing a chain of evidence modelled by means of root cause models, the decision-making process concerned with applying EA as a means to govern IT project is made more transparent. By providing a model based on which organization can make a cost efficient and effective decision, an implicit decision is made more tangible and clear. To conclude, this research has contributed to clarify the use of EA as a means to govern IT projects and has found a clear theory within the complexity of the subject.

6.3 Implications and suggestions for further research

Although this research provides a good understanding in how organizations decide to use EA as a means to govern IT projects, it can always be improved. The research provides a decision making model in the form of a multi criteria model, based on which resources and techniques can be allocated. These criteria are derived from a qualitative study, as well as the scales. These criteria and the possible scales of the model form an important subject for further research. These criteria and scales can be tested throughout the use of a quantitative study approach. Thereby the sample population could be enlarged and the outcomes of the model can be made more precise. In addition this increases the validity and the accuracy of the model.

Nevertheless, it could be argued that this model should be able to function within those organizations that participated within this study. At least within those organizations that assign specific resources and techniques to particular IT projects. This can be tested within practice. By comparing projects that get assigned all resources and techniques with projects classified based on the multi criteria model, it could be determined whether the model contributes or not. This contribution could be measured by the degree of which a particular solution is implemented in compliance with the EA. In addition it can be measured if this actually saves costs without deviating from the contribution to EA compliance. Thereby it could be determined how cost efficient and effective the model actually is.

The costs associated with the use of EA as a means to govern IT projects can be seen as an implication of this research. This research is started in the assumption that organizations make a cost-benefit consideration if the costs of applying EA as a means to govern IT project outweigh the benefits. The literature study provided a good understanding of the benefits associated with the use of EA in this context. In addition, interviewees were also asked about the benefits. However, the benefits could not be related to the costs. This was due to the fact that the costs of applying EA within this context could not be determined within the interviews. Additionally it could be argued that determine the costs of applying EA within this context and its relation to the benefits could be a research topic on its own.

Within several organizations it was noticed that the governance structure and the manner by which the tasks and responsibilities are delegated determines the degree to which the EA is complied with. It became clear that organizations that are more decentralized require a different division of the roles and responsibilities. Decentralized organizations, especially within the public sector are facing difficulties in adhering to the EA. Due to the fact that architectural processes are not mandated, the EA function is easily overruled by the business. In addition, the EA function is often too late involved in a project and the solution has already been determined even though it may not fit into the EA. This makes it impossible to apply EA and achieve its benefits. As a result, these organizations remain stuck at a low EA maturity level. Despite the fact that various statements with regard to this topic were found, it differed too much from the intended research scope. The influence of various governance structures on applying EA could be a good research topic on its own.

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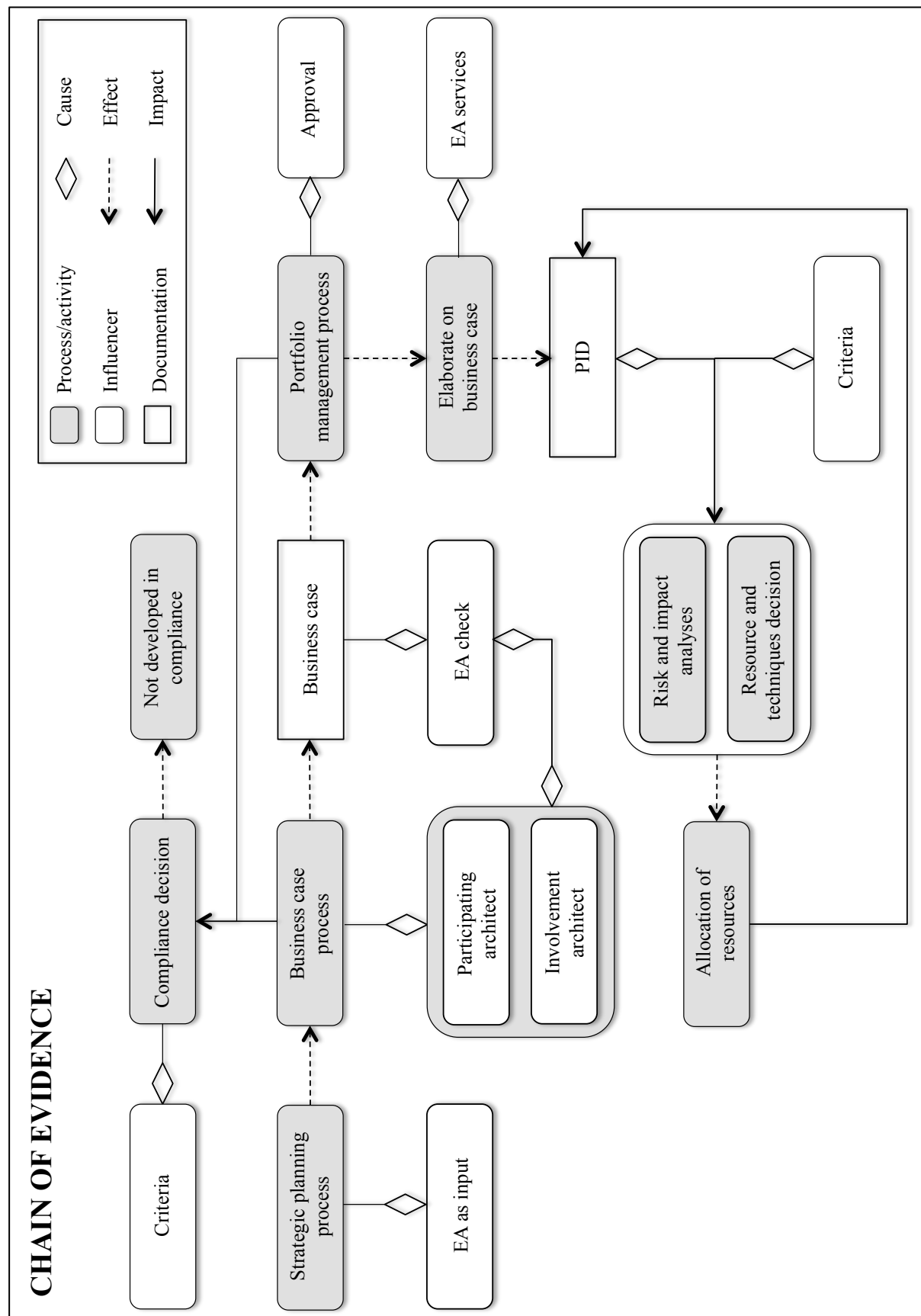
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ASSESSING THE DECISIONS MADE PRIOR TO THE USE OF ENTERPRISE ARCHITECTURE AS A MEAN TO GOVERN IT PROJECTS

Appendix A: Chain of evidence

CHAIN OF EVIDENCE

Legend:
- Process/activity
- Influencer
- Documentation
- Cause (◇)
- Effect (dashed arrow)
- Impact (solid arrow)

Appendix B: Statement database

Id	Uitspraak	Q Id	SQ Id	Tag 1	Tag 2	Tag 3	Tag 4	Comment	Organisatie
92	In welke mate het strategisch is, in welke mate draagt het bij aan onze target architectuur. Hoe meer het bijdraagt aan onze target strategie hoe meer bemoeienis.	16e		Criteria	Strategisch	Repliceerbaar			####
144	Zijn het meer van hetzelfde soort projecten dan wordt de bemoeienis minder, zoals het aansluiten van een nieuwe markt. Als je al 85 nieuwe marktten hebt aangesloten dan zou de 86e ook moeten lukken. maar meer omdat er veel geld in omgaat en omdat het politiek hot is.	16e	16e	Wel of niet Criteria	Kosten				####
96	Dit komt doordat er afhankelijk van het traject niet altijd het compliant zijn met de target architectuur op de eerste plaats staat. Dat is een keuze die je samen maakt, soms is de tijd belangrijker dan al het andere. gewoon	16d		Tijdsdruk	Wel of niet Criteria				####
101	Ook de projecten die we snel willen uitvoeren zijn nog wel redelijk conform architectuur. Er zijn sommige projecten met een externe deadline daar word nog vaak op afgeweken, maar dan is het van te voren wel afgesproken.	16c		Criteria	Tijdsdruk	Wel of niet			####
329	Ik moet het eerste project nog tegenkomen waar alle prince2 documentatie ook daadwerkelijk word aangeleverd	16b							####
81	Op een gegeven moment heb je niet volledig betrokken capaciteit om bij elk aanvraag betrokken te zijn. Dan moet je kiezen waar je een architect aan toewijst. Maar als wij niet volledig betrokken zijn dan hebben wij nog wel altijd de check aan het einde (compliance check).	16a	15	Capaciteit	Sturen op				####
94	Dan loopt er minder onder architectuur, in het geval dat er een aantal belangrijke projecten naast elkaar lopen dan verdelen we. We kiezen er dan niet voor om een belangrijk project niet onder architectuur te ontwikkelen, maar dan verspreiden we de tijd over die initiatieven en daarme wordt de mate van betrokkenheid lager.	16a		Criteria	Belang proj	Risico en in	Wel of niet		####
35	In het verleden moest ik de risico's veel meer afwegen, ik had toen minder capaciteit. Ik kan nu sneller reageren op vragen omdat de capaciteit hoger is.	16a		Capaciteit	Risico en impact				####
312	Ik kan niet aan elk project een architect toewijzen of architectuur services leveren	16a		Capaciteit	Toewijzen middelen EA	Toewijzen middelen EA			####
25	We hebben nu wel een architectuur vakgroep waar we samen overleggen en architectuur thema's met elkaar bespreken, maar dat is niet zoiets als een architectuurraad waar besluiten worden genomen en input wordt geleverd aan het besluitvormingsproces. We proberen samenhang te creëren in de architectuur.	11b		Foutief stu	Besluitvorming				####
26	wel hebben we een functioneel change advisory board met relatiemanagement waar we sinds kort weer invloed hebben op veranderprojecten. Die kun je zien als de strategische dialoog, echter is het niet strategisch meer omdat de doelen van het project al vastgesteld zijn. Je acteert op basis van de klantvragen.	11b		Sturen op					####
11	Maar ik zie nog steeds projecten ontstaan waar ik het bestaan niet vanaf wist en die buiten architectuur om gaan.	11a		Decentraal	Foutief stu	EA omzeilen			####
12	In deze situatie ben ik afhankelijk van projectmanagers die nattigheid voelen en toch maar even met een architect gaan praten.	11a	12	Rol project	Functie EA				####
95	Ja, er ontstaan meer afwijkingen en hierdoor is er meer "opruimwerk". Op een gegeven moment controleren we het eindresultaat ten opzichte met het beoogde resultaat en de delta is opruimwerk en dat wordt dan meer.	20	19	WZA	Wel of niet Nadelen	Opruimwerk			####
454	Het niet werken onder architectuur en afwijken van kaderstellingen heeft opruimwerkzaamheden tot gevolg	20		Nadelen	Opruimwerk	Opruimwerk			####
195	Daar komen oplossingen uit die voldoen aan de tijd maar weinig aan de architectuur visie	20		Wel of niet Nadelen	Opruimwerk				####
196	Achteraf zit je wel met het probleem dat dit weer rechtgezet moet worden.	20		Wel of niet Nadelen	Opruimwerk				####
197	De oplossing is maar 1 keer te gebruiken en dus moet er voor het volgende jaar weer een nieuwe oplossing bedacht worden.	20		Wel of niet Nadelen	Opruimwerk				####
198	Niet onder architectuur heeft als gevolg veel herzieningen en projecten die jaarlijst terugkeren om informatie te kunnen leveren aan derden.	20		Wel of niet Nadelen	Opruimwerk				####
173	Als je projecten zonder architectuur uitvoerd, is het minder georganiseerd en chaotiser, duurder.	20		Nadelen	Opruimwerk				####
124	Als de prioriteiten verkeerd gesteld worden kan het zo zijn dat je daarin nog helemaal niet beschikt over de bouwstenen die je nodig hebt (niet toerekend) en het later de oplossingen weer van deze bouwstenen moet voorzien.	20		Wel of niet Nadelen	Opruimwerk				####

Uitspraken | TAC ID | Blad3 | +

A	B	C	D	E	F	G	H	I	J
239	De units initieeren de projecten zelf en zij zijn ook verantwoordelijk voor hun eigen project portfolio	8		Initieeren p	Decentraal	Portfolio management			###
439	Een domein team bestaat uit een informatie manager, een programma manager en een architect en die driehoek is verantwoordelijk voor een domein	8		Initieeren p	Business case				###
440	We beginnen met architectuur in het strategisch planning process waar we gebruik maken van een begrootarchitectuur (doelarchitectuur) voor de kon	8		Strategisch	EA services				###
441	Na het strategisch planning proces (begroting) komt de business case daar heeft de informatie architect een belangrijke rol in	8		Business ca	EA services				###
336	De business heeft iets nodig, komt met een vraag, deze worden aangeleverd in business cases	8		Business case					###
337	Op papier zijn de architecten al bij de business case betrokken, maar in de realiteit nog steeds pas bij de goedkeuring	8		Business case					###
339	Strategische informatie ontwikkeling gaat per domein, daar komt een strategisch informatieplan uit, die woorden beoordeelt op basis EA	8		Strategisch	EA services				###
340	Als er projecten loskomen uit dit informatie plan dan moeten er business cases geschreven worden	8		Business case					###
311	Een architect is betrokken bij het portfoliomanagement process	8		Portfolio m	EA services				###
411	Wij maken gebruik van portfolio management, maar die is meer gefocused op business demand	8		Portfolio management					###
286	Doormiddel strategische planning en het broertje daarvan, strategische informatie planning worden te jaarlijkse projecten geidentificeerd dit gebeurt	8		Initieeren p	Portfolio management				###
288	Na ISP komt een business case die worden in de business gemaakt, daarna komt portfoliomanagement en daarna een project voorstel	8	5	Business ca	Portfolio management				###
374	De business ligt ten grondslag aan een project	8		Initieeren p	Business case				###
375	Architectuur is al betrokken bij de business case, althans er vind een architectuur toets plaats op de business case	8		Business ca	EA services			!	###
395	Alle verander anvraagen komen centraal binnen en daar kunnen we toetsen op de principes en kaderstellingen	8		Initieeren p	Principes en kaderstellingen				###
396	Doordat het portfolio management ook gecentraliseerd is, zien we alle aanvragen ook langskomen en kunnen we ook daar sturen met EA	8		Portfolio management					###
404	De hoofdstroom van projecten komen uit grote programma's, maar projecten komen ook vanuit oppertunities binnen de business en deze projecten w	8							###
165	Wij voeren elk project uit onder architectuur uit.	7		Wel of niet					###
90	een architect toe aan een het project om in het project mee te werken. / Ja, op basis van belang en afbreukrisico.	6	16	Criteria	Rol architec	Afbreukrisico			###
106	Ik zou nooit een architect full time toewijzen aan een project, dat gaat ook niet omdat de architecten allemaal een ander specialisme hebben (business, technology etc.) Het zit niet in ÈÈn persoon, dus ik zou altijd als team een project begeleiden.	6		Rol architect					###
18	daar vind ik eigenlijk van dat ze de architecten buiten het programma moeten plaatsen in plaats van toewijzen, die moeten onafhankelijk zijn.	6		Rol architect					###
268	De architecten van ons als die van de leverancier worden aangewezen als controlerend/adviserend architect aan een programma	6	16	Criteria	Programma	Rol architect			###
146	Nee wij wijzen een adviseur toe aan een een project. Hij signaleert en geeft onafhankelijk advies aan de programma of project manager en hij kan eventue	6		Rol architect					###
184	Na het maken van de PID krijgen de architecten een compliance achtige functie in de stuurgroep van een project. Wij bewaken de kwaliteit op basis van de PID en het programma start beslis document.	6		Rol architec	Stuurgroep				###
185	De architecten werken ook weleens mee binnen de projecten dat komt omdat wij met relatief weinig IT'ers werken. Er wordt dus meer van de architect verwacht dan enkel deelnemen aan de stuurgroep.	6		Rol architec	In project				###
225	De architect heeft een contolerende rol waarin hij op een aantal momenten iets van het project moet vinden (tolgates)	6		Rol architect					###
169	Wij zijn een architectuur afdeling waarvan de architecten elk 3 a 4 projecten doen. Als architect binnen de ING werk je ongeveer 50% van de tijd aan projecten dit schrijf je af op projectbudget. De andere 50% werk ik als adviseur en lever ik architectuur services, dit komt uit het architectuurbudget.	6		Rol architect					###
442	De informatie architect van een domein stuurt op de PSA en blijft daarna indien nodig controlling betrokken bij het project	6	11	Rol architec	Controlling				###
449	Ik wijs architecten als controlling aan de projecten toe die toetsen op de principes en kaderstellingen	6		Rol architec	Controlling				###
127	Vaak zie je dat er een project architect aan een project verbonden wordt en een programma architect aan een programma.	6		Rol architect					###
362	In principe heeft een project een projectarchitect, maar de persoon die deze rol toebedeelt krijgt varieert per project.	6		Projectarch	Toewijzen middelen EA				###
432	Het ADD moet goedgekeurd worden door een architectuurboard.	6		Architectuur board					###
287	Portfolio management rapporteerd naar de RVB, het advies op een projectrapportage wordt in samenhang met een architect gecreerd	6		Portfolio management					###
382	We werken altijd onder architectuur, maar passen de middelelen en documentatie wel aan want sommige projecten behoeven bepaalde middelen nie	6		Toewijzen middelen EA					###
407	De controlerend architect wijs ik niet altijd toe, nu enkel aan strategisch belangrijke projecten	6	16	Criteria	Projectarchitect				###
409	Wij proberen projecten enigszins vrij te laten en sturen waar nodig bij om meer controle over het project te verkrijgen	6		Rol architec	Projectarchitect				###
87	ADD's, maar ook PSA's. We gebruiken een tool BIZZdesign als repository. Architectuur principes, patronen en dat leggen we vast op een wiki omgeving	5		Toewijzen middelen EA					###
4	En alle nieuwe pakketten en nieuwe hardware moeten eerst langs de architecten voor de "architectuur toets"	5							###

Uitspraken   TAG ID   Blad3   +