An Approach for Enterprise Architecture and Business Model alignment

Master Thesis
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1 Introduction

The development of ICT industry has created new opportunities for businesses by creating the possibility of implementing various Business Models (BM) (Bouwman & van den Ham, 2004; Timmers, 1999; Versteeg & Bouwman, 2006). Different companies have tried to reestablish their competitive position in the industry by offering new services based on new or adapted business models (Boons, Montalvo, Quist, & Wagner, 2012). Entrepreneurs have created boosting start-ups through a combination of technological breakthroughs or service innovation, with sustainable innovative business models, and in some cases, solely through the latter (Chesbrough, 2010; Johnson, Christensen, & Kagermann, 2008; Magretta, 2002; Teece, 2010). However, there are many cases of failure due to inability to implement and operationalize a potentially promising business model (Timmers, 1998). If being implemented, these business models then have to be modified in short time intervals in order to respond to the rapid changing business environments. The firms have to deal with the business model dynamics caused by market, regulatory, or technology changes and realize those changes (Bouwman & MacInnes, 2006; Cavalcante, Kesting, & Ulhøi, 2011; De Reuver, Bouwman, & Maclnnes, 2007; Morris, Schindehette, & Allen, 2005). This causes complexity even in a single organization setting with one actor responsible for both business model and enterprise architecture development. However, today’s business environment requires collaboration of multiple organizations in which different actors are responsible for each domain. Managing the relationships between all these domains and actors is a complex issue. This complexity can be seen in a quote from one of the enterprise architects interviewed through this research:

“When you introduce yourself as an enterprise architect, most people within the company automatically assume that you are an IUT architect and you are related to technology. You have to add that you have a business perspective when looking at the IT systems, and it is a part of enterprise architecture. People usually don’t look at IT as a starting point for business.” (LA)

In today’s business environment, instead of being offered by a single enterprise, e-Services are increasingly offered by webs of collaborating companies and business units (Tapscott, Ticol, & Lowy, 2000). A service is defined as “a network-enabled entity that provides a specific capability” (Foster, Kesselman, & Tuceck, 2001). The problem grows in complexity when different firms seek trans-sector or multinational collaborations in order to deliver a service or product offering (Chapman, Soosay, & Kandampully, 2003; Solaimani, Bouwman, & De Reuver, 2010). If the firms in the business network are from the same industry then the similarity of their operational activities and processes may ease the implementation of the business model and realizing the offering. However, firms may reach out of their established ecosystems into new sectors to form new partnerships and collaborations in order to acquire required resources or capabilities, in order to jointly offer products or services (Dyer & Singh, 1998). The firms, then, will join in forming a new business model (Chung, Yarn, & Chan, 2004). In this situation, different or conflicting business processes, as well as the division of responsibility over different components of the service offering applications, and IT infrastructure can become problematic (Solaimani & Bouwman, 2012).

Business models and enterprise architecture models describe the organization in two different levels of abstraction. The focus of the business modeling approaches is on the value proposition that the firm has with its customer and business partners (i.e. Jordijn & Akkermans, 2001b). Companies use business model for describing the way the firm does business and creates and delivers value to its customers and business partners (Magretra, 2002). Only a few business modeling approaches (i.e. Bouwman, Vos, & Hauker, 2008) go any further in addressing the technological aspects of the frims’ activities. In contrary to that, enterprise architecture has its focus on the information systems. Enterprise architecture is used in order to gain a better understanding about different information system components and their interrelationships (Zachman, 1987). In chapter 2 an overview of the literature regarding business modeling and enterprise architecture approaches in addition to different streams of research analyzing the alignment of the two concepts from different aspects and using different approaches is provided.
Neither of the two concepts by itself can provide a rigorous description of the organization and its different activities. It can be argued that a combination of the two concepts should be used in order to provide a description of the whole business. Different scholars have suggested that the alignment of the business model, formed around a service, with the operational organization of the firm to realize that service, is a main success factor in implementing a sustainable business model (Bouwman, Vos, & Haaker, 2008; De Reuver, 2009; Janssen, Van Buuren, & Gordijn, 2005; Pipers & Gordijn, 2007b). Both of these concepts have limitations that create a need for analyzing their link and developing alignment between them. In this section, we analyze their limitations and the necessity of relating them through presenting cases and instances from related literature.

The case of Dell Computer Corporation’s business model, and the failure of its competitors in imitating that, illustrates how the limitations of (even a) promising business model can affect its success, and how firms can gain competitive advantage by foreseeing and overcoming those limitations. The fundamental choices in Dell’s business model were skipping resellers network and selling directly to the customers, and implementing a build-to-order mechanism that could reduce inventory costs, as well as reducing obsolescence in an innovation intensive and time-dependent industry (Magretta, 2002, p. 7). Among other factors, implementation and execution of these two design choices using IT played a vital role in the success of Dell’s business model (Kraemer, Dedrick, & Yamashiro, 2000, p. 3). Dell’s business model is not only a “good model” (Magretta, 2002, p. 7), but also “integrates strategic considerations, operational processes, and decisions related to economics” (Morris et al., 2005, p. 727). The company used IT to gain virtual integration among the participants of its network (Kraemer et al., 2000, p. 40). The direct link to the customers provided the company with the data that was necessary for implementing build-to-order policy. The company used IT in implementing these two parts of the business model, in a way that created cohesion and synergy between different activities. As an example, they took advantage of information sharing technologies in order to share design databases and methodologies with suppliers, and that caused a dramatic increase in the time-to-market of their products (Magretta, 1998, p. 76). The competitive advantage gained by Dell was partially due to implementing these kinds of processes that were essential for viability of the business model, and were hard for the company’s competitors to replicate (Teece, 2010, p. 180). The case of Dell’s business model and its imitators illustrates that the viability of the business model is dependent on its implementation, and the business model does not address that level of abstraction. Teece (2010, p. 182) uses the example of Gateway Computers as a Dell competitor who failed in implementing Dell’s business model, and it attributes its failure to the “inferior implementation of the processes” (Teece, 2010, p. 182).

Casadesus-Masanell and Ricart (2010) state that business models are consisted of three categories (policy, assets, and governance) of concrete choices and their consequences. These three types address the courses of action that the firm adopts, decisions about tangible assets, and the structure of decision rights over policies and assets respectively (Casadesus-Masanell & Ricart, 2010). However, business models do not go any further in foreseeing the implications of these choices in the firms operations, and providing a mechanism for ensuring their implementation. The implementation and operationalization of the business models is a neglected issue in the BM literature (Osterwalder, Pigneur, & Tucci, 2005). Consequently, the implication of design decisions in business model development on the firm’s information systems is also neglected. Business models do not address the relationship of information systems to the model. They only describe the business and its components, but how it should be implemented using information systems is out of their scope (Hedman & Kalling, 2003).

Business models do not provide a mechanism for ensuring effective usage of the resources and creating cohesion and synergy among different activities. Hedman and Kalling (2003) argue that for a profitable usage of the information systems as a resource, three factors of the resource itself, its activation, and the quality and cost of the offering must be managed. Failure to manage each factor will lead to not using or ineffective usage of the resources, or conflicting with other activities in case of effective use. They state that in certain cases, the business model do not go further than managing the first factor, the
resource, and it causes ineffective usage of the information systems, and consequently failure in capturing value and making a profit.

Shafer et al (2005) name misunderstanding about value creation and value capture as one of the problems associated with business models. They bring examples of firms that although being able to create value inside their business ecosystem, have failed in capturing that value and turning it into profit. Flaws in the assumptions that a business model is built on is another limitation identified by Shafer et al (2005). In their view, these assumptions include inaccurate anticipations and illogical or not well-founded cause and effect relationships. In Dell’s case, one cause and effect relationship for the competitors could be the disruption in their existing distribution networked, caused by imitating the direct-sell business model (Magretta, 2002, p. 8). Shafer et al (2005) also state that limitations in strategic choices considered, caused by not considering all aspects of the core logic of the firm in the business model, is a problem with business models. They bring the example of the eToys company that invested in customer acquisition, while neglecting order fulfillment processes, and that led to the firm’s bankruptcy (Shafer et al., 2005, p. 205). Finally, they show instances of business models failed due to their reliance on flawed assumptions about the firm’s value network, and mistaken perception about the behavior of the members of its value network in time (Shafer et al., 2005).

Businesses modeling approaches and methodologies also have certain limitations, which, in turns, translate into the business models designed using them. Differences between business models make them vary in their usefulness for describing different aspects of the business. For example, e3-value model describes value proposition in value networks, but does not address the internal resources and capabilities of the firms. At the same time, Business Model Canvas, although addressing internal resources and capabilities, is limited to a single firm, and does not address creation and transaction of value in the value networks. Each business model covers only a number of the business model components (Morris et al., 2005), and therefore, is unable to provide an overall analysis of the firm and its network. The summary of the issues are provided in appendix 1.

So far, it is illustrated that business modeling frameworks have certain limitations that if not considered, can become problematic. Enterprise architecture frameworks, as well, have certain limitations. Investigating these scopes of enterprise architecture and its limitations, helps to understand the value of linking the two modeling formalisms. The first limitation of enterprise architectures is that they fail in showing the dynamics of the system that they represent. Mellich (2013) states that “the dynamics of cognitive and social processes do not obey static representations and rules of architecture”. In addition to being static, Jonkers et al (2006) state that the variety of different enterprise architecture frameworks, methodologies, and modeling languages, in combination with the not similar terminology that they use, is an issue for the users. They name the size and scalability of enterprise architecture models as another issue, due to the wide scope of enterprise architecture (Jonkers et al., 2006). In addition, enterprise architecture has different groups of stakeholders, such as managers, domain specialists and developers, as its users (Jonkers et al., 2006). However, having its roots in information systems science, it is still IT centric. Although being considered as a means of communication among different groups, such as IT and business people (Lankhorst, 2013), the usage of IT terminology makes it hard to communicate with the business people.

Cung et al (2004) analyze the business model of a networked enterprise, and state that “co-operative architecture for information sharing” is a condition for IT infrastructures that enable this business model (Chung et al., 2004, p. 279). The ability of the commonly used enterprise architecture frameworks or modeling languages such as Zachman framework in modeling networked situations should be assessed. Camarinha-Matos and Afsarmanesh (2007) evaluate different modeling frameworks addressing different aspects of those organizations, and state that Zachman framework targets single organizations, and hence, “has little focus on behavior within endogenous elements” such as participants, relationships, information/knowledge resources, and processes (Camarinha-Matos & Afsarmanesh, 2007, p. 541). Although technological solutions (such as web services) are developed enabling technical integration in these situations, a high level enterprise architecture addressing this integration in the level of processes, organization and business issues, is still missing (Chen,
Dourneingts, & Vernadat, 2008). Modeling services, offered over value networks resulting from the collaboration of multiple firms, has certain complications. Coordinating multiple business initiatives, supporting multiple tires and multiple points of integration, and integrating applications into organization’s infrastructure makes developing enterprise architecture for such services a complex task (Kaisler, Armour, & Valivullah, 2005). A summary of the limitations of enterprise architecture approaches is provided in appendix 1.

The discussed cases and limitations show that integrating business model with the operational matters can lead to feasible business models. However, there are many cases that the gap between the two levels becomes problematic. Business model and enterprise architecture should be viewed as the complements of each other. Based on the mentioned limitations, it could be said that relating the two formalisms can facilitate designing business models for multi-actor situations, and realizing those models in the following ways:

1. **More accurate assumptions:** The accuracy of assumptions used in BM design will increase due to the awareness about EA. EA can provide guidelines to BM about the possibility of physical, application and process integration.
2. **Tracking responsibilities:** EA can assist in allocation of control and responsibilities over cost elements, revenue structures, activities, and processes to different actors.
3. **Road map for BM implementation:** Through relating BM and EA a structured way for BM implementation can be reached, and design decisions in EA can reflect design decisions in BM.
4. **Effective communication:** Using BM, and consequently BM terminology, as the highest level of EA can assist in creating an effective communication with the business.

There exists a bulk of theory trying to bridge the gap between firms’ strategy and operations, and create a desirable state that is called alignment, harmony, or fit in different literature (more explanation is provided in chapter 2). However, there is a lack of practical approaches that can be understood and used by the people engaged in strategy or information systems development. Therefore, in many cases, the existing theory does not help in obtaining the above values from bridging business model and enterprise architecture.

Another stream of literature is focused on the link between business modeling and enterprise architecture approaches. Despite of its importance, the link between these two modeling formalisms has gained the attention of the scholars only in the recent years, and there has not been many scientific works addressing, specifically, this issue are published (i.e. Fritscher & Pigneur, 2011; Jacob et al., 2012; Janssen et al., 2005; Meertens & Iacob, 2012). The existing business model and enterprise architecture alignment literature shares two characteristics, being: 1) having a single firm focus 2) being a correspondence relationship instead of conceptual alignment framework. As discussed later on, these characteristics lead to certain limitations in these alignment frameworks. The need for an alignment approach overcoming these limitations still exists.
The present master thesis is focused on business model and enterprise architecture alignment. In this section, the problem that this research is going to solve was introduced. Also, the research questions and the objectives that are going to be achieved through them are presented. The theory regarding the three main components of this research, being business model, enterprise architecture, and their relationship is explored and analyzed in chapter 2. Based on this theory, an alignment approach is introduced in terms of the relations between business model and enterprise architecture model components, and a set of steps for identifying alignment issues using those. Finally, in chapter 3, the methodology of this research is introduced, and in chapter 4, a qualitative case study is performed in order to assess and improve the practical relevance of the outcome of this research. Finally, in chapter 5, the theoretical and practical contributions of this research, as well as its limitations and some future research areas are presented.

1.1 Previous work on the issue

The present master thesis is a part of a research path in Delft University of Technology. The limitations of BM approaches and EA frameworks, as well as the benefits of relating them, were identified before, and have been the subject of scientific research. Solaimani & Bouwman (2012) have developed the VIP framework for business model and business process model alignment. This generic and conceptual framework uses different conceptual layers of value exchange, information exchange and business processes, in order to implement different business modeling approaches. This framework conceptualizes the interactions among actors in trans-sector innovations into these layers and their components. Also, although being different in scope, this framework, together with other approaches, can be used as the basis of the alignment addressed in this master thesis. The practical relevance and usefulness of the VIP framework is analyzed by Cifuentes (2012) through applying it on a case study.

1.2 Research Questions

The necessity of relating business model and enterprise architecture was presented in the previous section. Also, in chapter 2, it is illustrated that the existing frameworks for business model and enterprise architecture alignment lack in generality and practicality. The main question of this research is aimed to cover this knowledge gap, and the following sub-questions are designated to assist in reaching an answer for it.

1.2.1 Main question

This research aims to find a way to relate business model with enterprise architecture, through analyzing the relationship between VISOR business model (El Sawy & Pereira, 2013) and Archimate (Lankhorst, 2004). A detailed description of these two modeling frameworks is provided in chapter 2. The choice of the BM and EA modeling approaches was made based on the following criteria:

1. Having practical and academic acceptance
2. Having representativeness and being used for practical and academic purposes
3. Being able to address the issues of multi-actor settings
4. The opportunity to access and analyze real-life cases that use them

VISOR business model addresses different aspects of services offered over a value network. In addition, having user centricity and value proposition as its core values decreases the chance of inaccurate assumptions about the value network and possible misunderstandings about value creation and value capture. Finally, the framework has found applications in e-health service development (i.e. Fife & Pereira, 2011). Archimate’s scope is enterprise wide, and it provides an integrated approach for modeling all aspects of enterprise. It bridges between different modeling languages and uses them for creating more detailed models for the individual elements of the high-level model provided by Archimate (Lankhorst, 2004). Archimate is widely accepted and used in the industry, and there were possibilities for accessing and analyzing real-life cases using this modeling language. A more extensive description and analysis of Archimate and its different components is provided in the next sections.
Alignment refers to developing the enterprise architecture plan and different components required for realizing a certain service or product offering, based on its business model, describing the logic and mechanisms of its value creation and capture of that offering. Also, maintaining the implementation of the changes rooted in either side, on the other side. Practical relevance refers to the theoretical model being reliable for modeling services. Practical relevance will be determined by the accuracy in describing all the elements over a real project. The focus will be on one organization, but there exists awareness about the networked environment and its characteristics.

Therefore, the main question of the present Master Thesis is:

*How to align business model with enterprise architecture through relating VISOR business model and Archimate?*

### 1.2.2 Sub-questions

In order to assess the feasibility and develop such an approach, besides the need for understanding VISOR business model and Archimate, gaining further insight into the different business model methodologies and enterprise architecture frameworks, indicating their main components and the leverage points are necessary. Also, the relationship between these two concepts should be well defined. The first three sub-questions are about assessing the feasibility and developing the alignment framework. The final sub-question is about improving the approach and adopting it based on the insight gained from the case studies.

**Sub-question 1:** What are the main components of the business modeling approaches and enterprise architecture frameworks?

The focus of this sub-question will be on VISOR business model and Archimate. However, in order to develop an alignment approach, an analysis about other business modeling methodologies and enterprise architecture frameworks should first be performed. This sub-question is addressed in sections 2.1 and 2.3.

**Sub-question 2:** What are the characteristics of the relationship between enterprise architecture and business model?

The alignment is about the conjunction area of business model and enterprise architecture. There are different views among scholars about the nature of this relationship. In addition, there are several approaches, frameworks, and methodologies addressing the relationship between these two concepts. In order to develop an alignment approach, an appropriate viewpoint about this relationship must be selected to develop the approach based on it. In selecting such a viewpoint, the criteria derived from the characteristics of network enterprises should be considered. This sub-question is addressed in section 2.5.

**Sub-question 3:** How can existing alignment frameworks, approaches, and methodologies be used to relate VISOR business model and Archimate?

Within the scope of this sub-question, the alignment frameworks, approaches and methodologies found and explored in sub-question 2 will be applied on VISOR business model and Archimate. An alignment approach between these two modeling formalisms will be developed based on these approaches and the insights gained in question 1. This sub-question is addressed in section 2.7.

**Sub-question 4:** How to apply the developed approach to the real-life cases?

The applicability of the model has to do with measuring the effect of applying the approach for alignment of VISOR and Archimate on a case study. During the course of analyzing this sub-question, an insight about the real-life situation will be gained, and the approach will be refined in order to increase its practical relevance. The case study is addressed in chapters 4 and 5.
1.3 Research objectives

The final deliverable of the present master thesis is an approach for the alignment of VISOR business model and Archimate. This approach will first be developed based on the existing literature on enterprise architecture, business model and their relation. Then, they are modified and improved based on the insight about the real-life reality, gained through performing a case study. This approach is aimed to fill the previously identified knowledge gap by being applicable to multi-actor settings and providing a conceptual alignment instead of a correspondence relationship. Instead of converting the components of a business model to their corresponding components from enterprise architecture plan, it will provide the architect with some structure to develop and maintain alignment between the business model of a service offering and the architecture of the enterprise that is going to deliver it. Using this alignment approach, architects or architectural groups can assure the conformance of the design decisions in developing Archimate models and the information provided to it with the requirements of the business model, by viewing the architecture model from the lens of VISOR. In addition, business strategists can gain better insight about the enterprise architecture model and it helps them in adopting the business models to the limitations imposed or opportunities provided by the information systems, infrastructure, and processes, reflected in the Archimate model.

1.4 Conclusion

In multi-actor settings, due to the complexity of the value network and various information system architectures within actors, relating business model to enterprise architecture gains more importance for increasing the viability of the business and obtaining more value from information systems. Business model identifies value exchanges that virtual integration in those points could be critical. Business model needs to expand into more operational layers and enterprise architecture needs to extend its boundaries from a single firm into those critical exchange points. The business processes that are spread between multiple actors, the functions that the actors co-perform, and all the points that actors are dependent to each other, and hence value creation is dependent on those, should be identified and critically analyzed, in order to identify and resolve potential issues. In this way, value conflicts between actors will be avoided and synergy and cohesion between the activities will be reinforced.

The link between the two worlds, being business model and enterprise architecture, is the issue that this research tries to address through the stated research questions. After exploring the literature regarding business model, enterprise architecture, and their link, an alignment approach is developed, and then tested and adjusted through a case study. On the two sides of the issue stand business strategists and enterprise architects. Using the results of the following research, strategists can have a more realistic view of the capabilities and shortcomings of the information system, and assess the viability of the business model based on those. In addition, enterprise architects can have a better understanding of the missing capabilities that are required by the business model, as well as those capabilities that if used can increase the value creation and capture by the firm.
2 Theoretical background and alignment approach

To explore the knowledge gap in business model and enterprise architecture, we should first have an understanding of each of the two concepts of business model and enterprise architecture. In addition, an analysis about the existing alignment approaches and their limitations and shortcomings is required.

2.1 Business Model

Although there has been a large body of scientific literature on the topic of business model, a common definition is yet to be obtained, and the concept is still ambiguous (Al-Debei & Avison, 2010; Ghaziani & Ventresca, 2005; Morris et al., 2005; Shafer et al., 2005; Solaimani & Bouwman, 2012; Versteeg & Bouwman, 2006). There are different definitions for business models in the literature having different thematic indicators such as architecture, value network, business actors and roles, strategy, customer, asset configuration, knowledge leverage, business logic, and cost and revenue (Al-Debei, El-Haddadeh, & Avison, 2008).

Different business model definitions each highlight some aspects of the issue (Pateli & Giaglis, 2004). Some scholars view it as a method that provides a narrative explanation about how a firm does business and delivers value to its customers, or the organization’s core logic for value creation (Linder & Cantrell, 2000; Margetta, 2002). Another approach is defining business model through its functions as articulation of the value proposition, identification of the market segment, definition of the structure of the value chain, estimation of the cost structure and profit potential, description of the firm’s position in the value network and the formulation of the competitive strategy by which the firm will gain and hold advantage over rivals (Chesbrough & Rosenbaum, 2002). Taking a more systematic approach, Osterwalder et al. (2005) name product innovation, customer management, infrastructure management, and financial aspects, as the basic elements of the business model and define it as a conceptual tool, aimed to describe the business logic of the firm using these elements and their interrelationships. Haaker et al. (2006) name four domains of service, technology, organization, and finance, for business models, and define them as a model of the collaborative efforts of different firms in providing an offering to their customers together. Another group of scholars highlight the relation of the firm’s business model to its strategy. The definition given by Morris et al. (2005) is that business model describes how an interrelated set of decisions in different areas are joined to create competitive advantage, and Shafer et al. (2005) define it as how a firm can create and capture value within a value network based on their core logic and strategic choices. Business model is also defined as a link between the strategy and business processes (Al-Debei et al., 2008). Finally, Amit and Zott (2001) highlight value proposition, structure and governance and state that “A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities” (Amit & Zott, 2001).

During the business model discussion, different classifications for the literature addressing the concept are introduced (Afuah & Tucci, 2001; Al-Debei & Avison, 2010; Alt & Zimmermann, 2001; Osterwalder et al., 2005; Pateli & Giaglis, 2004; Shafer et al., 2005). These classifications agree on business model definition, components (constituent elements of business models), conceptual models (reference models and ontologies), taxonomies (categorizations of business models into a number of typologies), change methodologies (guidelines in changing an existing business model or adopting a new one by organization), and evaluation models (assessing different aspects of new business models) as the streams of business model research (Osterwalder et al., 2005; Pateli & Giaglis, 2004). Different scholars have also decomposed the business model into its constituent components (such as value, revenue sources, price, related activities, implementation, capabilities and sustainability) (Afuah & Tucci, 2001; Hamel, 2000; Osterwalder & Pigneur, 2002; Weill & Vitale, 2001), functions (such as identification of market segments or estimation of cost and revenue structures) (Chesbrough & Rosenbaum, 2002), or elements (such as service, organization, technology and finance) (Alt & Zimmermann, 2001; Haaker et al., 2006; Mahadevan, 2000).
There are also business model taxonomies, including business models classified under certain criteria (Al-Debei & Fitzgerald, 2010; Alt & Zimmermann, 2001; Kaplan & Sawhney, 2000; Mahadevan, 2000; Rappa, 2003; Timmers, 1998; Weill & Vitale, 2001). In the recent years, an emergence in the literature toward the applications of business models in different areas, as well as business model innovation could be identified (Casadesus-Masanell & Zhu, 2012; Chesbrough, 2007, 2010; Gambardella & McGahn, 2010; Sinfield, Calder, McConnel, & Colson, 2012).

Finally, another stream in business model literature is a number of business models ontologies. Shanks et al. (2003) define ontology as a “theory about the structure and behavior of the real world in general.” In the case of business models, ontology helps in understanding the phenomena that takes place within the models (Shanks et al., 2003). BM ontology defines a set of concepts and relationships between these concepts that helps construct a BM in more than one, and ideally every, situation (Gordijn & Akkermans, 2001a). Business model ontology would allow practitioners to understand the elements, relationships and value exchange of a product of service. The importance of ontology lies in the necessity to facilitate communication between many stakeholders, with different terms and interpretation, in trans-sector innovations (Gordijn & Akkermans, 2001a).

Some examples of these ontologies are REA (Geerts & McCarthy, 1999; McCarthy, 1982), e3-value (Gordijn & Akkermans, 2001b), Business Model Ontology (BMO) (Osterwader & Pigneur, 2002; Osterwalder, 2004), STOF (Service, Technology, Organization, and Finance) model (Bouwman et al., 2008) and the Ballon’s approach (Ballon, 2007) that is derived from and aligned with the STOF model, the Components Business Model (CBM) framework (IBM, 2005), the Four-Box Business Model (Johnson et al., 2008), entrepreneurs business model approach (Morris et al., 2005), business model schematics (Weill & Vitale, 2001), and VISOR (El Sawy & Pereira, 2013).

2.2 VISOR Business Model

Previous section provided an overview of the business model literature. Based on the reasoning in section 1.2, the focus of this master thesis is on the VISOR framework. In this section VISOR business model is explored in more details.

2.2.1 Theoretical foundations of VISOR

The research by El Sawy and Pereira (2013) that led to the development of the VISOR framework was aimed to reach a unified business modeling framework with the main purpose of building digital business models in business ecosystems, and expanding the components of the business model in an operationalized way. Their goal was to develop a framework that could help in understanding the dynamics of the digital business ecosystems with a focus on the future enterprise. Finally, they have shown the use of the framework, and how it can be used to derive views and scenarios for new digital business models through case examples.

In their view, the networked digital industry was the initial field that gave importance to the business models for digital platform, and then it got expanded to other industries. Since digital platforms are being used for offering more services and products, the importance of the digital business models is also increasing. The authors believe that digital business models have fundamental differences with their previous generation due to their three attributes of time compression, turbulence, and new architectures.

VISOR framework is based on an extensive analysis of the past research and practice in business models. They define six phases for the progress of business model theory. The first three phases are giving definitions and taxonomies for business models, expanding those definitions by suggesting some components for the business models, and elaborating on those components. In the fourth phase, reference models of the components are developed and evaluated, and in the fifth phase, these models are applied to the cases. The authors view their research as the sixth phase of the progress, which is theory building and dynamic modeling. They develop the set of components of the VISOR Model by classifying the variety of the components previously introduced by other scholars, and adding to them.
elements that were missing or not being explicitly mentioned. Finally, they state that the success of a business model depends on creating alignment between these components in a way that maximizes the willingness to pay in the target customer of a service or product, while minimizing its real cost.

2.2.2 VISOR framework

The VISOR framework is consisting of a number of components derived from the past research on business models. These components cover the different dimensions of a digital service. The higher-level components are divided into two groups. The first group (value and revenue/cost) determines the real value proposition, and the second group (interface, service platforms, organizing model) determine the real cost of delivery. El Sawy and Preira (2013) then state that the alignment of the components, while maximizing customers’ willingness to pay through maximizing the value proposition for them, and minimizing the real costs through finding an optimized combination of the cost deriver components leads to the success of a business model.

The higher-level components of VISOR can be divided into those that contribute to value proposition and those that contribute to the cost of delivery. The two higher-level components that contribute to value proposition are:

1. **Value**: value proposition for targeted customer segment
2. **Revenue/cost**: revenue and cost model calculations for all participants

VISOR developers use , among others, the definitions of Chesbrough and Rosenbaum (2002), Osterwalder and Pigneur (Osterwalder & Pigneur, 2010) and Afuah and Tucci (2001) and define value proposition as providing a service or product to a particular customer segment that addresses an unmet need of the customers or an alternative way for them to access a product or service, and makes them willing to pay a premium price for that. The components resulting from value proposition are:
customers, customer value, customer understanding, and customer relationship. The value component provides answer to the issues such as “to what extent the product or service addresses the customers’ need”, “the size of the market niche”, “does it have any complementarity with any other product or service currently used by customer”, and, “to what extent customers can add to or alter the product or service.”

The other higher-level component that contributes to real value proposition is revenue/cost model for different participants. For the revenues gained from a product or service to exceed its costs, the network of actors that has co-created the value should succeed in capturing a substantial part of that. This component addresses the financial aspects, financial model, financial flows, and revenue stream of the service. The structure of pricing, the way revenue is shared among partners, cost evaluation, the expectations about the demand, and the time it takes for the product or service to become profitable are the issues that this component addresses.

There are three higher-level components that contribute to the real cost of delivery:

1. Interface: or the “wow” experience
2. Service platforms: platforms that enable delivery
3. Organizational model: for processes and relationships

The way users experience the interface of a service is a factor in the success of delivery. Within the boundaries drawn by affordances and limitations of a technology, the business modeler should come up with an interface that creates the “wow” experience in the customer. This interface component also views the customer interface as a value interface, and addresses its services and linkages. The questions that should be answered under this component are if the interface helps in satisfying the exact need of the customer, if its affordances enhance value proposition, or its limitations have a negative effect on the value proposition, and its relation to other interfaces used by the user.

The other higher-level component in the real cost of delivery section is the organizing model, that describes how the network of actors form the business processes, value chains, and their interrelationships to deliver the product or service. To do so, organizational characteristics, key partnerships, channels, value networks, connected activities, and stakeholder network should be determined. It should be made clear that what resources and lower-level services are necessary for delivering a service or product, what partners to select to obtain access to those resources, what is the dependencies in the relationships with those partners, and how to choose a mix of partners to minimize the threat of competitors.

Finally, service platforms enable the business processes and relationships required for a product or service delivery, shape them, and provide support for them. Service platforms determine the core technology that the service or product is formed around it, and the volume and direction of the required investments in IT infrastructure and other key resources. Also, they define the relationships that are necessary for the product or service delivery and the logistical streams that enable that.

2.2.3 Business modeling using VISOR

VISOR positions itself in the business model theory, in a stage of “dynamic business modeling for the future” (El Sawy & Preira, 2012, p. 15). Their designed approach follows the design theory by Wallas et al (1992,2004). They have proposed a design process for business modeling using VISOR framework.

In this process, for each of the higher-level components (organizing model, service platforms, interface, value, and revenue/cost) meta-requirements, meta-designs, kernel theories, and testable design product hypotheses should be identified and developed (see El Sawy & Preira, 2012, p. 22). Based on the specifications of the product or service that is being designed, meta-requirements are defined for each of the VISOR higher-level components, indicating the class of goals that should be followed in designing each of them. The choice of the design methods and kernel theories used in it depends on the specific product or service offering, and VISOR descriptors. A set of artifacts that
should be designed in order to reach the goals indicated in meta-requirements, and the kernel theories addressing them, are then identified. The meta-requirements are in fact the answers to a selected set of lower level components.

The final product of VISOR framework is a set of design products, designed based on their meta-design to satisfy their meta-requirements. These design products are specified in terms of the lower-level components and their interactions.

2.3 Enterprise architecture

Enterprise architecture is a concept that has been defined by scholars such as Zachman (Zachman, 1987), who is known as the guru of enterprise architecture, and taking a practical approach by consultancy groups and standardization organizations (i.e. The Open Group, 2009). In this section, we will only provide brief descriptions of different views on enterprise architecture, its main concepts, and its limitations.

One of the first definitions for architecture in the information systems domain, given by Zachman (1987), is “a logical construct for defining and controlling the interface and the integration of all of the components of the information system.” He found development and use of this logic construct necessary due to the increasing complexity and size of the information systems (Zachman, 1987). Also, Doucet et al (2008) argues that enterprise architecture, at its core, aims to bridge the gap between business and technology and should include the dependencies between a variety of elements. Versteeg and Bouwman (2006) define business architecture with a focus on responsibility on the activities. In their view, “The business architecture arranges the responsibilities around the most important business activities (for instance production, distribution, marketing, etc.) and/or the economic activities (for instance manufacturing, assembly, transport, wholesale, etc.) into domains”. They, then, define enterprise architecture as the business architecture with an enterprise-wide scope (Versteeg & Bouwman, 2006). All the above definitions are complimentary, and can jointly define enterprise architecture. The first definition elaborates on the system characteristics of the organization, the second one bridges strategy and technology and addresses organization’s coherency, and the third one addresses the determination of the cost of and the responsibility over different components of the system.

The open group’s architectural framework (TOGAF) (2009) make the definition of architecture dependent on its contextual usage. They address design and implementation, and evolution and change management, and state that “Architecture has two meanings depending upon its contextual usage: (1) A formal description of a system, or a detailed plan of the system at component level to guide its implementation; (2) The structure of components, their interrelationships, and the principles and guidelines governing their design and evolution over time” (The Open Group, 2009). Another definition, from the developers of Archimate that is an enterprise architecture modeling language, defines enterprise architecture as “a coherent whole of principles, methods, and models that are used in the design and realization of an enterprise’s organizational structure, business processes, information systems and infrastructure” (Lankhorst, 2013). Gartner’s (2008) definition differs from the two above definitions in highlighting the importance of business vision, strategy, and communication. They define enterprise architecture as “the process of translating business vision and strategy into effective enterprise change by creating, communicating, and improving the key principles and models that describe the enterprise’s future state and enable its evolution” (Lapkin et al., 2008).

Finally, a widely agreed definition of architecture, given by ISO/IEC/IEEE (2011), is “fundamental concepts or properties of a system in its environment, embodied in its elements, relationships, and in the principles of its design and evolution.”

Janssen (2009) has developed an architectural meta-framework that provides an overview of different components of enterprise architecture. In this meta-framework, he has used a layered approach in order to organize subsystems, categorize similar objects, and deal with complexity. Such layer based view is
widely used in enterprise architecture, dividing it into technology architecture, application architecture, and business architecture layers (Hasselbring, 2000). Business architecture defines the organizational structure, roles, activities, business rules, and processes that will further be translated into ICT infrastructure, described as technology architecture, through the application architecture (Hasselbring, 2000). Stallings (2006) states that each layer performs a cohesive or closely related set of functions, lower layers provide services to higher layers, and being loosely coupled allows isolating changes in one layer.

Janssen’s (2009) also addresses the relationship of enterprise architecture to the environment through relating it to the Program of Business Demands (PBD). In his meta-framework PBD has the responsibility to relate the business environment and strategies to enterprise architecture. However, this does not happen through modeling formalisms. PBD is the translation of elements such as products, market segments, and market and technology development into a set of requirements for enterprise architecture. These requirements are presented in terms of guidelines and principles that guide the architecture development process. The two remaining components of Janssen’s meta-framework are architectural governance, that is the mechanisms that the enterprise uses in order to add value through architecture (Peterson, 2004), and design projects implementing the architecture.

![Figure 2-2 Architectural meta-framework (Janssen, 2009)](image)

### 2.3.1 Business architecture

Business architecture and enterprise architecture are two closely related concepts. There is a need for distinguishing them and positioning them regarding each other. Versteeg and Bouwman (2006) view business architecture as the link between business strategy and organization, processes, and information and communication technology. In order to structure these three aspects, they first use the concept of business architecture to structure responsibility over business and economic activities into domains. They differ business architecture from enterprise architecture by defining a supply chain, enterprise, or business unit level scope for that, rather than the only enterprise-wide scope of enterprise architecture. In their view of business architecture (Versteeg & Bouwman, 2006), *business domains*, areas of accountability composed of coherent business functions and objects, have a central role, where they are responsible for dealing with the high level business processes. Therefore, they state that business architecture consists of (1) business domains and their related business activities and added value, (2) business functions and concepts necessary for them to perform their intended activities, and (3) high level business processes showing the interrelations of these domains and the way they collaborate toward reaching the organizational goals and strategies.
In their approach, business architecture is directly derived from the hierarchy of strategy statements and is better to assign its development and maintained by business people. This helps the company to gain an insight about the consequences of each strategy statement and to easily trace the design decisions back to the strategies, and facilitates implementation of organization, process and IT architectures.

Based on their view on business architecture, Versteeg and Bouwman (2006) develop an architecture linkage model. In this model, coupling IT functions and data creates ICT supply domains that can address one or more business domains. Since the creation of these, ICT supply domains are tightly related to decomposition of business functions, these supply domains are aligned with the needs of the business domains. The other relationship in their model is the usage of functions and objects by subprocesses that are realized by service applications. The ICT supply domains may then be outsourced or work independently from business domains through service level agreements.

This alignment in their approach, therefore, is done through the business architecture. For instance, in their case study, when the business case of sales and marketing is customer centricity, and its core value is customer intimacy, business domains are organized based on customer group, brand or market, that leads to more appearance of sales business domains, or when it is expanding business channels, business domains are organized based on channel type and geography, that leads to more distribution domains.

Wolfenden and Welch (2000), define the concept as a link between the firm’s strategy and business processes, applications, and IT infrastructure. Similar to the previously introduced approach, they view the role of business architecture as providing views on different aspects of the organization, and bridging the gap between strategy and their implementation using processes, roles, behaviors and information.

2.4 Archimate

2.4.1 Theoretical foundations of Archimate

Archimate is the result of a joint research between different companies and knowledge consortiums, aimed at developing a coherent and integrated enterprise description language (Jonkers et al., 2003). It is a modeling language and standard for modeling, visualizing and analyzing an organization, its different components and their interrelationships (Icaob, Jonkers, Lankhorst, & Proper, 2012). This language is developed based on IEEE 1471 (2000) and ISO/IEC/IEEE (2011) standards by a group of business practitioners and scholars (Jonkers et al., 2003).

The need for Archimate is due to the limitations of other description languages. These languages share the following shortcomings (Lankhorst, 2013, p. 48):

1. Weakly defined relations between domains and lack of inter-domain integration.
2. Lack of clearly defined semantics and a solid formal basis
3. Being domain (business, application, technology) specific and not providing an overall architectural vision.
4. Low understandability for managers and consultants

Based on the shortcomings of other languages and to answer to the needs that companies have during design, communication, realization, and change phases of enterprise architecture, Archimate is developed with the following characteristics (Lankhorst, 2013):

1. Compositionality: Decomposing the functionalities of the architecture, into the functionalities of its components and their relations in order to cope with its complexities
2. Integration of architectural domains:
   a. Integrating architectural models of different domains developed using different languages (i.e. UML, BPMN) by different stakeholders having different concerns.
b. Integrating structural components (i.e. software components) with behavioral concepts (i.e. software functions)

These two characteristics require the language to be developed in a way to fulfill the following requirements (Jonkers et al., 2003):

1. Building a balance between the specificity of the concepts and languages (such as UML, IDEF and BPML) that organizations use, and creating a view of the systems' entities and their interrelations using a general set of architectural concepts (such as object, component, and relation).
2. Creating a common conceptual foundation for heterogeneous architectural description of different domains that each is represented in its specific form.
3. Having the ability to create different views on the system, each showing those aspects addressing the concerns of a certain type of stakeholder.

The meta-model of the Archimate language, explored in the next section, tries to fulfill these requirements. In order to deal with the first issue, they use a level of concepts in between the generic and specific levels, which can further be generalized or specified in order to address the two other levels. For relating the heterogeneous models, the descriptions in other languages can be translated into Archimate descriptions, or can be mapped or, simply, linked to Archimate objects. Finally, the definition of the concepts and their representation, therefore the graphical representation of the concepts and relations can be selected and varied to form different views addressing the stakeholders’ concerns (Jonkers et al., 2003).

2.4.2 Archimate meta-model

A set of architecture modeling concepts and their interrelations are designated in order to realize those requirements listed in the previous section. These concepts and relationships form Archimate’s meta-model (Jonkers et al., 2004). Different notions, concepts, and their relations in Archimate are based on a variety of standards such as IEEE 1471 (2000), and conventions such as those in UML (Lankhorst, 2013). In exploring the Archimate meta-model, two concepts of conceptual domains and layers should first be introduced.

Conceptual domains

The developers of Archimate identify the following seven conceptual domains based on architectural methods such as TOGAF and tools such as ARIS, and the expertise of the organizations participating in Archimate. Each of the conceptual domains describe an specific domain in the business (Jonkers et al., 2004):

1. Product: products and business services of an organization
2. Organization: business actors and their corresponding roles.
3. Process: business processes and business functions and the activities that form each.
5. Data: a presentation of information suitable for automated processing, embodied in data objects.
6. Application: application services and functions, and application components and interfaces.
7. Technical infrastructure: platforms and hardware supporting the applications including infrastructure services and functions, devices, networks and software systems.

Layers

Different architecture frameworks have used a layered base approach in modeling the enterprise (i.e. Sowa & Zachman, 1992) and this approach is used in different organizations. In adherence to that, Archimate also views the organization as a layered set of systems, where the lower layers provide support for the higher layers (Jonkers et al., 2004). In this sense, the service concept has an essential role in this layered base architecture. Lower levels offer services of different nature and granularity to
the higher levels. Therefore, the relationship between the layers is either a use relationship, where a higher level entity uses a lower level service, or a realization relationship, where an element from a lower level realizes an element in its higher level (Lankhorst, 2004). The following three layers are common among different layered based approaches and are used by Archimate (Lankhorst, Proper, & Jonkers, 2009):

1. Business layer: products and services that their offering is realized through business processes consisting of activities performed by actors in different roles.
2. Application layer: software applications that provide application services to the business layer.
3. Technology layer: processing, storage, communication and other infrastructural services that support the application layer.

In addition to these three layers, Lankhorst (2004) suggests a fourth layer, that is the environment layer, to be added to the top of the business layer, in order to model the customers of the organization that use its services. Also, the boundaries of these layers are not solid. Dividing these three layers into sub layers can create new layers (Lankhorst, 2004).

The concepts in each layer are divided into active structure concepts, passive structure concepts, and behavior concepts. Passive structure concepts in enterprise architecture models are mostly information objects and data objects (Lankhorst et al., 2009). Jonkers et al (2003) explain information, behavior and structure aspects by stating that a system is formed from different actors that each has a structure (they may be composed of other actors), does some behavior, and use and exchange information (Jonkers et al., 2003).

As illustrated in (Lankhorst et al., 2009), in addition to the behavior/structure dimension, the concepts in each layer have two more dimensions: internal/external views and individual/collective behaviors. The external view is the interfaces of the services in each layer, and higher layer elements use these services through these physical or logical locations, where the delivery points of the functionality of the service are located. The internal view is the internal realization of the service concept. Finally, the behavior that is performed by a collaboration of a collection of actors in different roles is collective behavior, and if a behavior is performed by a single role, it is an individual behavior.

The general structure of the models in every layer is the same and in accordance with behavior/structure, internal/external and individual/collective dimensions. The only difference between these models lies in their nature and granularity (Lankhorst, 2004). The Archimate models, no matter in which layer they are designed, follow the structure in figure 2-3.

![Figure 2-3 The core concepts in three dimensions (Lankhorst, 2004).](image)

This similarity in structure, facilitates aligning the models from different layers to each other (Lankhorst, 2013).

In the newer version of Archimate, Archimate version 2.0, motivation, and implementation and migration extensions are added to the model. The motivation extension includes concepts such as stakeholders, business goals, principles, and requirements, and models the motivation behind the choices made during the design process. The concepts in implementation and migration extension are work package, deliverable, plateau, and gap, and provides support for portfolio management, gap analysis, and transition and migration planning (The Open Group, 2012).
Figure 2-4 shows an overall view of the Archimate core concepts.

![Figure 2-4 Core concepts in Archimate (Lankhorst, 2013)](image)

In the next section, we will explore the concepts in each of the cells of the above figure in more details.

### 2.4.3 Archimate concepts

**Business layer concepts**

In this section, the architectural description concepts that stand in the business layer are reviewed. This layer includes information, product, process and organization conceptual domains and their corresponding concepts. The list of the components of this layer and their definitions is provided in the appendix 4.

![Figure 2-5 Meta-model of business layer (The Open Group, 2012)](image)
Application layer concepts

The application layer of Archimate shows how the application services are provided to the business layer. The list of the components of this layer and their definitions is provided in the appendix 1.

![Figure 2-6 Meta model of application layer (The Open Group, 2012)](image)

Technology layer concepts

The technology layer of Archimate shows the hardware and software services in the infrastructure level that provide support to the application layer. The list of the components of this layer and their definitions is provided in the appendix 1.

![Figure 2-7 Meta-model of technology layer (The Open Group, 2012)](image)

2.4.4 Archimate views and viewpoints

Op ’t Land et al (2009) state that an enterprise architecture project involves several stakeholders and should address their concerns. This happens through developing views focused on these stakeholders and their concerns. In IEEE (2000) standard, a view is defined as the combination of a stakeholder and a concern, and a view is a representation of a model from a specific viewpoint.

Lankhorst (2013) classifies Archimate viewpoints into designing, deciding and informing. The views developed based on these viewpoints, respectively, assist designers in the design process, managers in the decision-making process, and serve as a means of communication with different stakeholders. The intention here is not to explain Archimate views and viewpoints. In addition to Archimate standard views (see Lankhorst, 2013), here, we focus on three high-level viewpoints that could help in translating the information in the business model to enterprise architecture models, as well as reducing the complexity of architectural models for the business strategists. The importance of these three
viewpoints is that they can guide the design of other viewpoints such as those concerning key applications and key technology:

1. Organization viewpoint
2. Actor cooperation viewpoint
3. Business function viewpoint

These viewpoints are explained using the Archisurance examples provided by (Lankhorst, 2013).

The organization viewpoint shows the internal decomposition of the enterprise into departments or other organizational entities, in order to show their competencies and responsibilities. In multi-actor settings, this view can be expanded to cover the whole networked organizations, and show different involved stakeholders and their physical location, as well as the decomposition of competencies and responsibilities between them.

![Figure 2-8 A view developed from the organization viewpoint (Lankhorst, 2013, p. 174)](image)

The relationships and dependencies between the organization and its partners is a source of complexity. The actor cooperation viewpoint shows the positioning of the organization in its value network. This viewpoint is useful in showing the collaborations and dependencies between the organization and its partners, as well as how their combinations realize business processes (Lankhorst, 2013, p. 172).

![Figure 2-9 Two views from actor cooperation viewpoint. The view on the right shows the collaborations of the actors, and the view on the left shows information flows between them (Lankhorst, 2013, p. 175)](image)

The business function viewpoint shows the general operations of the organization by showing the architecture of its business functions, which include the most stable activities that the organization performs (Lankhorst, 2013). This viewpoint enables exploring the flow of goods, information, and other business and value objects between different business functions, as well as tracking and delimiting the boundaries of these functions between different actors.
2.5 The relationship between business model and enterprise architecture

There are different fields of literature that could be used in exploring the relationship between business model and enterprise architecture. In this chapter, these fields of literature are reviewed.

2.5.1 Contingency theory

A definition of contingency theory is given by Donaldson (1999) saying that “contingency theory states that there is no single organizational structure that is highly effective for all organizations” (Donaldson, 1999, p. 57). He continues that the contingency theory states that different optimal organizational structures could be found depending on different factors (such as size or organizational strategy) that are, in fact, organizational characteristics, and are named contingency factors. In order to gain effectiveness, the company should develop a fit between the contingency factors and its structure. Different sets of contingency factors are relevant to different parts of organizational structure, and this is the aim of contingency research to identify corresponding factors to each part of the organization (Donaldson, 1999, p. 57).

Van De Ven and Darzin (Van De Ven & Drizin, 1985) argue that the concept of fit has a central role contingency theory, and introduce three approaches for interpreting it: selection, interaction, and systems. In selection approach, fit is “the result of an evolutionary process” and forms through “natural or managerial selection at macro-level of organization.” (Darzin & Van De Ven, 1985, p. 516). The second interpretation, views fit as “adherence to a linear relationship between dimensions of structure and context” (Darzin & Van De Ven, 1985, p. 519). The third interpretation, systems approach, uses the knowledge gained from analyzing pairs of a single contextual factor and a single structural characteristic. Through this approach, that knowledge is aggregated in order to provide an understanding about the whole organization. Fit in this approach is defined as “a feasible set of equally effective internally consistent patterns of organizational context and structure” (Darzin & Van De Ven, 1985, p. 521). Following this discussion, Venkatraman (1989) introduces six perspectives for fit in strategy research based on the degree of being specific of the fit based relationship, and the choice of criteria in anchoring the specification of the relationship (Venkatraman, 1989).

2.5.2 Business and IT alignment

Business and IT alignment is a broad issue and many researchers have worked on it in the past decades. The intention here is not performing a literature review on the topic. Instead, we will base the analysis on the work performed by Chan and Reich (2007), and try to find theories that can be used within the specific scope of business model and enterprise architecture alignment. They extract the following
three alignment definitions from the literature, elaborate on its different aspects, and explore a literature stream of alignment models developed by different scholars (Chan & Reich, 2007, p. 300):

1. Benbasat (1996): “the degree of fit to which the mission, objectives, and plans contained in the business strategy are shared and supported by the IT strategy.”
3. McKeen and Smith (2003): “strategic alignment of IT exists when an organization’s goals and activities and the information systems that support them remain in harmony.”

As can be understood from the above definitions, the scope of business and IT alignment research is broader than the scope of this master thesis. The first difference is that while all of these definitions talk about the alignment of “strategy” with other components, this master thesis does not go further than the business model. Although sometimes being used interchangeably, business strategy and business model are differentiated in the literature. Al-Debei et al (2008) define business model as the link between strategy and business processes and Chesbrough and Rosenbaum (2002) as a mediator between technical and economic domains. The business model in the literature is more defined as a plan of action and an implementation of the strategy, and in this sense its scope is different from it. The second difference is that the second side of the alignment addressed in this research does not match with the scope of “IT” considered by the above definitions. While the above definitions include IT strategy, this master thesis is focused on enterprise modeling. Finally, business and IT alignment research addresses the issue only in a theoretical level, and does not address the practical issues directly (Ciborra, 1997). Based on these three reasons, although the business and IT alignment discussion is related to the subject of this master thesis, they have different focuses. More related streams of literature are business model and business process alignment, and business model and enterprise architecture alignment, which will be explored in the next sessions.

2.5.3 Business model and enterprise architecture alignment

The literature about the alignment of enterprise architecture frameworks and business modeling approaches is scarce. Although there are many consultancy firm produced content in the field (Jonkers, Quartel, & Blom, 2012), but from the best of the author’s knowledge, only a few scientific articles address specifically business model and enterprise architecture alignment. In this section, we will only review the literature addressing explicitly business model and enterprise architecture alignment in order to assess their limitations and the existing knowledge gap in the field.

Iacob et al (2012), has tried to relate EA to BM, to develop a realistic cost/benefit analysis technique for the service offerings, and to develop a method for change management based on the EA and BM relation. They have selected Business Model Canvas because, as they state, other frameworks did not have enough formal foundations (Iacob et al., 2012). However, by selecting BMC, their framework will be automatically more focused on a single firm, rather than a network since BMC’s scope is a single organization. They have also selected the Archimate language and framework due to its wide acceptance in industrial community (Iacob et al., 2012). The alignment framework, however, does not go further than relating the Archimate concepts to those of business model ontology, and defining those correspondence relations. In a similar research, Fritscher and Pigneur (2011) have also developed a “business visualization of enterprise architecture”, that is a visual representation of the correspondence of Archimate elements, with those of business model Canvas.

Taking a similar approach, Janssen et al (2005) have tried to link cost and revenue of a service in a single model, which is based on e3-value model and Archimate. They do not provide any reasoning regarding the choice of these two frameworks. They have developed their alignment approach based on a running case. They state that, enterprise architecture and business model are two different views on a same object, with business model being more business focused, and enterprise architecture technology focused. They argue about a “striking similarity” between the meta-models of business model and enterprise architecture. They have developed a “combined conceptual model” based on these
similarities and finding correspondence relationships between different components of the two frameworks. However, this developed conceptual model combines the business model canvas with, only, the business layer of Archimate, and leaves its application and technology layers untouched. (Janssen et al., 2005).

**BM/EA alignment approaches and multi-actor settings**

The existing alignment frameworks have limited applicability to multi-actor settings. The number of platforms bringing more than one firm together in offering a service, as well as other collaborations between firms from same or different sectors has grown in the last years (Tapscott et al., 2000). This growth has created a need for a conceptual framework facilitating the implementations of the complexities of the new value networks into IT applications and infrastructures. Without the implementation of the value propositions inside the business level into activities, applications, and infrastructure, allocating cost and revenues of a service to its different creators will be difficult.

The alignment framework proposed by Iacob et al (2012) limits itself to a single firm setting by choosing Business Model Canvas for the business model side of the alignment. The chosen business model does not emphasize the value creation and transaction between different firms in a value network. Due to its limited scope, it is more applicable for modeling the business model of a single firm, or a service provided by a single company. This limitation of the selected business modeling methodology automatically limits the scope of the alignment framework built based on it.

In addition, although in the business model used in the framework developed by Janssen et al (2005) is e3-value model, the alignment method limits the applicability of the framework to multi-firm settings. The alignment framework does not go any further than aligning the business model, with the business layer of enterprise architecture, and leaves the rest to the enterprise architecture. There is no connection from the business model components to the application and technology layers of the enterprise architecture.

**Correspondence relationship versus conceptual and analytical alignment**

The common thought among these three enterprise architecture and business model alignment frameworks is that they do not differentiate the objects that business models and enterprise architectures deal with. Instead, they believe that business models and enterprise architectures are only two different views on a same object. In this sense, they have developed alignment frameworks that exhibit the corresponding relationship between components of an enterprise architecture framework, with business model. In these alignment frameworks, missing components in both enterprise architecture and business model sides are then developed, and using these introduced components an alignment framework is developed.

For instance, in the mapping alignment method provided by (Fritscher & Pigneur, 2011) all of the components from business model Canvas are mapped to only the business layer of Archimate. In this sense, this alignment method will have low applicability to the technology intensive, and more specifically, IT intensive firms. For such a purpose, a more technology-oriented business modeling approach, such as VISOR, might better suit the intentions of the architects. Also, when the business model is directly derived from IT services and products, many direct mappings from different components of the business model, to the infrastructure and application layers of Archimate will be expected.

Another problem with the above approaches is their unclear added value to the enterprise architecture process. They may serve a communication purpose, although only in small firms as will be explained further, but they do not provide the architect with any specific method or framework for reaching the enterprise architecture through the lens of business model.

The correspondence relationships proposed by the mentioned alignment methods limits agility and increases complexity. In the absence of a conceptual alignment framework, it seems that a change in both business model or enterprise architecture side will require massive effort for redefining the
relationships. This is even worst for the method developed by (Fritscher & Pigneur, 2011; Meertens & Jacob, 2012) and in the case of medium and large enterprises. Their method tries to visualize the alignment of application portfolio and IT infrastructures and services with the stakeholders, and business services and processes. For medium and large firms with a very large number of applications and infrastructure in each domain, this will only add up complexity.

The mentioned approach gives these alignment methods limited practicalities. That is mainly because the common practice of enterprise architecture is different with their approach. From the consultancy firms produced content (Jonkers et al., 2012) it can be understood that the architects’ mapping between business model and enterprise architecture concepts varies in different situations, and they do not use such a fixed mapping suggested by the above literature. For instance, in practice, mapping the business model concept of resources depends on the type of that specific resource. Based on the type of the resource, the architect may decide to map it to different components (i.e. human resources to actors, information to data objects, etc.). However, in alignment method provided by (Fritscher & Pigneur, 2011) the Canvas concept of “key resource” is only mapped to the Archimate concept of “resource”.

The approach taken by most of the mentioned alignment frameworks is to provide a detailed framework covering all elements of reality (Iacob et al., 2012). Such an effort, due to the vast variety of situations in reality, may not have a high chance of success. An opposite approach could be providing a more generic framework that allows and applies for variations in the details in reality.

By considering a certain business modeling approach and a certain enterprise architecture framework, the alignment approaches will automatically have less practicality for the firms not having a well-established enterprise architecture, and, for many companies, this is the case (Franke, Ekstedt, Lagerstroem, Staat, & Winter, 2010; Jonkers et al., 2006). In addition, there are many companies with an “IT architecture” instead of “enterprise architecture”, meaning that their architecture is disconnected from strategy (Ross, Weill, & Robertson, 2006), and it causes less applicability of the alignment frameworks that are based on a certain enterprise architecture. Consequently, a set of guidelines or a generic framework can be more useful for these organizations.

In addition, having the interactions of the different actors engaged and different components used in offering a service, and not only the elements of an enterprise architecture or business modeling framework, could lead to a more helpful framework. Such a framework, with different abstraction layers, could help the architect to gain insight about the main lines of alignment of the two frameworks, explaining the business and technology side of a service. Having this insight enables the architect to create the alignment by performing the required work on a set of highlighted details in each unique situation.

2.5.4 Business model and business process model alignment

Canvas to BPMN

Bergholtz et al (2005) tries to bridge the gap between CANVAS business model and BPMN, using the value web (e3-value model), in the following three steps:

1. Construction of the business model
2. Partial derivation of a value web model from the business model
3. Detailing the value web model into process model

In constructing the business model, they highlight the role of partnerships, as value transfers between actors, and compensations, as the value objects exchanged in such a transfer. Using these two components, with considering partnerships as resource provisions and compensations as the flow of those resources between actors, they track the delivery of the final value proposition to the end customer and develop the value web, its corresponding process model.

They argue that the influence of risk and risk mitigation instruments must be considered in all three steps of business model, value web, and process model designs. In order to deal with those, they also
propose a methodology for incorporating risk management methodology with their three steps alignment methodology. They enrich the three steps method by adding three steps for identifying the risks, their corresponding risk mitigation instruments, and modeling those instruments, after each of the three steps.

E3-value to BPMN

There are two methods for transforming the e3-value business model to BPMN. One approach by (Weigan et al., 2007) divides the information in the value model into two groups of those relevant to communication (coordination between providers and customers required for initiations and completion of value transfers) and those relevant to resource management (physical flow of resources and planning of activities in time). They argue that these two aspects, together with the risk aspect (risk of partial or complete failure in completion of value transactions), are the basis of the design decisions in the process of designing the process model (Weigan et al., 2007, p. 57). In this approach the value model is first translated to communication and resource management models in a conceptual level, and then are implemented.

For translating the value model to the resource management model, for each value port and its associated value transfer two sub-processes for receiving and providing the value resource are introduced and linked to the sub-process that represents value activities. Additional sub-processes for managing practical details may also be introduced. This conceptual model then is implemented using the logistics and risk analysis, through mapping the conceptual routes to the physical routes, containing the physical movement of the resource from one physical location to another. For translating the value model into the communication model, for each value transaction one sub-process for negotiation, and for each value transfer that includes the transfer of rights a sub-process for transferring rights, and for other value transfers an evaluation sub-process are introduced. The implementation of this conceptual model is through translating the communicative actions into messages.

The other approach, Activity Dependency Model (ADM), is developed by (Edirisuriya & Johannesson, 2008) and is used as an intermediary step. Each of the business model and process model lacks information that can be combined in ADM. On the one hand, the business model has information about the creation and exchange of value objects among actors. On the other hand, it does not address the order of the exchanges of value objects. Therefore, serving as an intermediary conceptual level, and being more detailed than the business model and less detailed than the process model, ADM is used to relate the two models. This approach includes a number of rules for translating the e3-value to ADM, and then to process model. Similar to the previous approach, in the first step, value transactions are mapped to coordination processes, and value interfaces are mapped to exchange processes. Trigger dependencies relate these two kinds of process together, and to production processes that are added when an actor has to produce some resource needed for an exchange. In the second step, for different kinds of coordination processes, exchange process, and dependencies, different sub-processes are introduced; those together form the corresponding process model.

E3-value to UML

Another stream of literature has tried to align the process model developed based on the UML, with the e3-valu business model. Andersson et al (2006) use a chaining methodology to extend the e3-value model and link e3-value model to UML. They differentiate the resource from three other components value exchange, being right, custody, and evidence document. They introduce three notions of right, as being entitled to use the resource, and custody, as having immediate control on or control to the resource, and evidence document that services as the certification of the buyer’s right on a resource. In order to develop the process model from the value model, first it should be decided if each component of the value exchange exists, and if it should be modeled explicitly. In the next step, for each value transaction one negotiation process, and for each arrow in the extended model one actualization and (optionally) post-actualization processes are added. The actualization process is where the transaction is carried out, and the post-actualization process is where possible complaints are performed. Finally,
based on the goals of the actors and the resource managed by the process, a process pattern will be assigned to each process.

Taking a similar approach, Pijpers and Gordijn (2007a) propose the e3-transition model for bridging the economic e3-value models to the high level and low level process models. However, it stops at the high-level process models, and does not address how low level process model are made from high level ones. In the e3-transition model, they separate the flow of the value object, from the transfer of its ownership rights. In order to implement this logic, they use the notions of ownership right as the right to use and claim possession of a value object, and possession right, as the right to have the actual value object. As an example, a transport company has the possession right over a value object, while the ownership right is dedicated to its owner at the time of transfer.

Translating the e3-value model to the e3-transition model is about deciding if the ownership and possession rights for each value object transition are the same, or they are independent, and hence should be presented by both ownership and possession right transfers. After creating the e3-transition model, each actor is mapped to a swim lane in the process model. The possession right transitions are converted to send and receive processes, and the ownership right transitions are converted into exchange of ownership right and proof. The initiation and termination points of the value transfers are identified and modeled with, respectively, request and receive processes. Finally, the model is adopted based on the order in which the processes happen (Pijpers & Gordijn, 2007a).

2.6 VIP framework

The VIP framework (Solaimani & Bouwman, 2012; Solaimani et al., 2010) is a generic framework to fill the gap between business model and business in trans-sector innovation, when a group of collaborating organizations in a value network offers a service or product. The developers of VIP framework aim to develop an alignment approach that covers all important aspects of actor interactions, and can be used for aligning different business modeling and process modeling tools and techniques together. Having these two characteristics, the framework suits the purpose of this research, being VISOR and Archimate alignment. The authors conceptualized the relation between business models and business processes into three domains of value exchange, information exchange, and business processes, and for each domain define a set of components. These domains, components, and the interrelationships between components and layers, extracted through extensive literature study, form the VIP framework.

Value exchange

Multi-actor environments consist of actors that have to work together despite of their different frame of reference, often-conflicting interests, and the role and share of themselves or other actors in creating and capturing value in the value network. The value domain abstracts this complexity by introducing a set of elements: actors, their profit or utility increasing activities (value activities), money or goods that they exchange (value objects), their goals, and the way they are related to and dependent on each other through these activities, objects and goals.

Therefore, the elements of the value domain are as follows (Solaimani & Bouwman, 2012, p. 8):

1. Actors (stakeholders): Independent economic entities that make profit or increase utility by carrying out value activities.
2. Value objects: Money or good that is valuable to one or another actor and is exchanged by them.
3. Value activities: Value exchange, offering, receiving or confirming, performed by an actor to increase profit or utility.
4. (Value) goals: The intentions that actors have for collaboration and should be achieved.
5. Value dependencies: The way actors are related to each other through goals, activities, and objects, due to the need that they have for the value object possessed by another actor.
Information exchange

The developers of the VIP framework, knowing information as an essential resource in information and communication technology enabled service innovation, have separated the information domain from the value domain (Solaimani & Bouwman, 2012).

The information layer consists of the following components (Solaimani & Bouwman, 2012, p. 10):

1. **Data objects**: Any digital recording that can be assessed by human and stored, processed, and transmitted electronically.
2. **Information objects**: Processed data that has gained context and meaning through processing.
3. **Knowledge objects**: The objects, concepts and relationships that are assumed to exist in some area of interest.
4. **Information flow**: The way information flows between actors.
5. **Information authorization**: Access to data, information and knowledge.
6. **Information dependency**: When in the relationship between two actors the exchange of information should happen before any action by the other actor.

Among these elements data objects, information objects, and knowledge objects are further decompositions of value object. Also, value goals and value activities form and direct information flows. Finally, value dependencies are translated into information dependencies and actors can gain or grant access to data, information, and knowledge through information authorization.

Business processes

In VIP framework, business processes are considered as the means to implement the business model. When multiple actors try to collaborate in a value network, the business processes become very complex due to the dynamic, iterative, and non-linear nature of interactions among them in different phases (Solaimani & Bouwman, 2012). To deal with this complexity, a classification of business processes is adopted and their different aspects are conceptualized and addressed in the business process layer of VIP.

The components of the business process domain are (Solaimani & Bouwman, 2012, p. 11):

1. **Primary business processes**: The group of business processes that are performed by the first tier actors and are required for creation and realization of the product or service offering.
2. **Business process behaviors**: Graphical elements used to represent activities behavior such as sequence flow, iteration, and conditions.
3. **Process unit boundaries**: Units are used to limit the scope of a group of related processes, belonging to a particular system, task, organizational unit, or such.
4. **Business process dependencies**: When the execution of a number of processes is required before another process (es) can be executed.

The same as the relation between the value and information layer, the process layer is also related to the information layer. Between these two layers, information authorization determines the process unit boundaries, information dependencies are related to business process dependencies, data, information and knowledge objects are used and created by business process behavior, and the primary business processes follow (and realiz) the information flows.
In order to relate the business model developed using VISOR framework to Archimate, we use the VIP framework as the primary intermediary conceptual level. In section 2.8 it is discussed that why VIP was selected as the basis of this alignment approach. In relating the components of VISOR frameworks and the concepts of Archimate at first to the VIP components, and later to each other, we use the definitions and classifications of these components and concepts in VISOR, VIP, and Archimate. In addition to that, due to vague definition of VISOR components, the existing business model and business process model alignment approaches are used to reinforce the relationships between VISOR and VIP.

It is important to mention that the relations in tables and figures related to the alignment approach of this master thesis are translation relationships. Translation here means to develop the elements of one concept based on the ones in the other concept. Therefore, the relations in the tables and figures provided in this and the next section are not data or information mapping relationship. That is because the data or information in one level is not considered as the equivalents of the related data or information of the other level. For example, there is no equivalent component for financial flows component of VISOR in VIP or Archimate. The relations also are not aggregation relationships since one end of the relation is not a part or a subordinate of the other end. Instead, they are only translations of information from one level to another level. It means that the component on one end of the relation provides “some” information about the component on the other side. Therefore, a total view of a component can only be gained by considering all of its related components. For example, there are more than one component in VISOR providing information about the actors component of VIP. Only by considering all of these related components (such as customers, stakeholders network, and key partnerships), the actors component of VIP can be developed.

2.7 VISOR and Archimate alignment approach

In the previous sections, the VISOR framework was explained, and it was stated that its final product is represented in a set of design artifacts, that are presented in terms of VISOR components. In this section we relate those components to VIP components, in order to relate them to Archimate concepts through VIP. However, VISOR framework addresses various aspects of a service or product, which not all of them need to be related to Archimate. For example, core technology investments and customer understanding components, is the result of the gap analysis and the latter not related to the aspects of the enterprise, and neither of them needs to be implemented. In addition, some VISOR components such as financial aspects are too broad in definition to be translated into one or a set of VIP components.

Below, there is a list of the VISOR components that could be related to Archimate through VIP, as well as their equivalent VIP components.
<table>
<thead>
<tr>
<th>#</th>
<th>VISOR component</th>
<th>VIP component</th>
<th>Explanation (Definitions from (El-Sawy &amp; Preira, 2012; Solaimani &amp; Bouwman, 2012))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VISOR component</td>
<td>VIP component</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Customers</td>
<td>Actors</td>
<td>Customer is a type of actor in VIP.</td>
</tr>
<tr>
<td>2</td>
<td>Customer value</td>
<td>(Goal) value</td>
<td>What the customer values can be translated to the one class of goals in VIP.</td>
</tr>
<tr>
<td>3</td>
<td>Customer understanding</td>
<td>Information, Knowledge object</td>
<td>The concept is not directly related to enterprise architecture modeling. However, if viewed in terms of the knowledge about the understanding of the customer about the service, then it can be transformed to information or knowledge objects in VIP.</td>
</tr>
<tr>
<td>4</td>
<td>Customer relationship</td>
<td>Value objects, Value activities</td>
<td>Customer relationship can be defined as a set of value activities that are performed through channels that are considered as value objects.</td>
</tr>
<tr>
<td></td>
<td>Revenue model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Revenue stream</td>
<td>Value activities,</td>
<td>All the revenue received from the customer when accessing a certain value object, through a value activity. In another words, a value activity that is translated into a request and receive process that is initiated and terminated by customer, and through that the ownership right and proof are exchanged between customer and the firm (Pijpers &amp; Gordijn, 2007a).</td>
</tr>
<tr>
<td>6</td>
<td>Financial model</td>
<td>-</td>
<td>The concept is too broad to be related to the VIP concepts</td>
</tr>
<tr>
<td>7</td>
<td>Financial flows</td>
<td>Value activities, Value dependencies, Value objects</td>
<td>The revenue addressed by the revenue stream component propagates in the network, whenever an actor is granted the ownership, and not possession, right over a value object and compensates by paying for that, as described in Pijpers and Gordijn’s (2007a) approach. Therefore, it may address these value objects, as well as the need (dependency) for them.</td>
</tr>
<tr>
<td>8</td>
<td>Financial aspects</td>
<td>-</td>
<td>The concept is too broad to be related to VIP concepts</td>
</tr>
<tr>
<td></td>
<td>Interface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Customer interface</td>
<td>Value objects</td>
<td>Customer interface can be considered a value object by itself since it has value for one or more actors.</td>
</tr>
<tr>
<td>10</td>
<td>Services and linkages</td>
<td>Value activities, Information flows</td>
<td>The services and linkages associated with an interface are provided by different actors through value activities, and are possible through (and also generate) flows of information.</td>
</tr>
<tr>
<td>11</td>
<td>Value interface</td>
<td>Value activities</td>
<td>Value interfaces show the points in which value objects are exchanged between actors and in this way contribute to creating value activities that are performed between different actors (Gordijn &amp; Akkermans, 2001b).</td>
</tr>
<tr>
<td></td>
<td>Service platform</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Key resources</td>
<td>Value objects, Information objects, Data objects</td>
<td>If the network is dependent to a certain value object, information object, or data object, and it is shared through the value network, then it can be considered as a key resource in VISOR. In the approach by Bergholtz et al (2005) resources are the value objects.</td>
</tr>
<tr>
<td></td>
<td>IT infrastructure</td>
<td></td>
<td></td>
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<td>---</td>
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<tr>
<td>13</td>
<td>IT infrastructures can be considered as value objects for the organization.</td>
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<tr>
<td></td>
<td>• Value objects</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Logistical stream</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>By definition it addresses various issues related to the design of the supply chain for the business. Therefore, it provides information about the exchanges of value objects between actors in terms of value activities, and their orderings in terms of value, information, and business process dependencies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Value activities, Value objects, Value dependencies Business process dependencies, Information dependency</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Although the concept is too broad to be related to VIP concepts, however, the technology and technological artifacts can be modeled as value objects, since they are valuable for one or more actors.</td>
<td></td>
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<tr>
<td></td>
<td>• Value object</td>
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</table>

### Organizing model

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<tr>
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<tbody>
<tr>
<td>16</td>
<td>Channels</td>
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<tr>
<td></td>
<td>In VIP, The channels through which actors cooperate or communicate can be modeled with the value objects, since they have value for the whole business ecosystem.</td>
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<tr>
<td></td>
<td>• Value object</td>
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<tr>
<td>17</td>
<td>Organizational characteristics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The decomposition of stakeholders and their values are the realization of the organizational characteristics.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Stakeholders Value goals (propositions)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Key partnerships</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It gives information about the resources and capabilities that partners have that makes them critical for the collaboration. Also, by definition a key partner is the one who owns a valuable and irreplaceable resource or capability that other partners are dependent on it. In the approach by Bergholtz et al. (2005) partnerships are translated into value transfers between actors in the form of exchanges of value objects.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Value dependencies, Information Access, Process unit boundaries, Actors Info, process, value dependencies</td>
<td></td>
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<td></td>
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<tr>
<td>19</td>
<td>Stakeholder network</td>
<td></td>
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<tr>
<td></td>
<td>Stakeholder network gives information about actors, and their concerns and values.</td>
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<tr>
<td></td>
<td>• Actors, Value goals (propositions)</td>
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<td></td>
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<tr>
<td>20</td>
<td>Connected activities</td>
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</tr>
<tr>
<td></td>
<td>Since a primary business process is composed of sub-processes, and in turns composed of detailed activities, detailed information about the activities enables the designer to design the whole process map.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Primary business processes, business process behaviors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>21</td>
<td>Value network</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Based on the definition, a value network generates economic value by performing value activities and exchange of tangible and intangible assets. Therefore, it gives information about actors, value activities, and all types of resources that flows between them. This is in line with the definition of value network, value activity, value object, and value dependencies in E3value model (Gordijn &amp; Akkermans, 2001b).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Value activities, Information flow, Actors, Data objects, Information objects, Knowledge objects, Value objects, Value dependencies</td>
<td></td>
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</tbody>
</table>

As illustrated in table 2-1, although VISOR provides enough information to develop the VIP components, some VIP components are addressed with more than one VISOR component, each expanding a certain aspect of them. As an example, value dependency in VIP is defined as “how different actors are related to each other through goals, activities, and objects. These relations are in terms of dependencies, which indicates that one actor needs the value objects of another actor” (Solaimani & Bouwman, 2012, p. 662). This definition has different components that each, a group, or some aspects of them are addressed by different VISOR components. Revenue stream takes the
customer as an actor and the money as object. The financial flows component includes all actors and considers, also, other value objects. In the value network component the relation is defined between activities. And finally, in key partnerships, the emphasis is on dependency to the resources and capabilities. Therefore, value dependency could be only developed using a group, and not only one, of the VISOR components.

2.7.2 Relating Archimate concepts to VIP

In order to relate Archimate concepts to VIP component the two following logics are used:

1. Applying the classification of Archimate concepts to VIP components
2. Matching the definitions of Archimate concepts to VIP components

As illustrated in section 2.4 Archimate concepts are classified in layers and aspects. Placing VIP components into these categories is the first step to gain insight about the potential links between VIP and Archimate. However, this classification only applies to the components in resources and capabilities, and interaction groups, plus the stakeholder component from the value network. That is because only these components can be directly related to Archimate models, and as illustrated later, the rest should be implemented using modeling techniques.

Table 2-2 Classifying VIP components in resources and capabilities, and interaction groups base on Archimate categories

<table>
<thead>
<tr>
<th>Business layer</th>
<th>Passive structure</th>
<th>Behavior</th>
<th>Active structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Value) goals,</td>
<td>Value activities,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Value objects,</td>
<td>Information flow,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knowledge objects,</td>
<td>Primary business processes,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information objects,</td>
<td>Business process behaviors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data objects</td>
<td></td>
<td>Actors,</td>
</tr>
</tbody>
</table>

Expectedly, all of the VIP components are translated into business layer, and not application or technology layer, concepts. That is due to the scope of the VIP framework that only includes value interactions, information interactions, and business processes, and does not go into the application or technology layer. The VIP framework positions itself as a linking bridge between business model and business layer, therefore does not address application layer and infrastructure layers of Archimate.

In table 2-2 the data objects component of VIP is placed in the business layer of Archimate. This is despite of its positioning in the application layer in Archimate. The focus of VIP is inter-organizational collaboration, which means transfer of different value objects (such as data, information, and knowledge) between organizations. However, the focus of Archimate is on a single organization. The positioning of the data object in the business layer in this case is in line with the level of analysis in VIP, inter-organizational, that is different from that of Archimate.

In addition, some of the above components can be directly translated to Archimate concepts, but some others are translated into the way a part of Archimate model is developed, and how the concepts are linked to each other using Archimate relationships. Here, first for the latter group of VIP components, we show how they can be modeled using Archimate, and next for the former group, we find their equivalent(s) in Archimate concepts.

As stated before, except for the actors component, it is not possible to place the components from business ecosystem and interdependencies group into the above table and to find immediate Archimate equivalents for them. In order to realize those components, the two following ways are used:

1. Using the business event component and triggering relation in Archimate: to implement different variations of value, information, and process dependencies.
2. Using Archimate views: to model the business ecosystem.

Archimate views that can be used in order to implement the functionalities of those elements are as follows:
1. Organization structure view: showing different stakeholders, their decomposition, and their physical location
2. Collaborations of actors: shows the actors, and the roles they play individually, or in collaboration with other actors.
3. Business object flow: shows the flow of business objects between different actors and roles.
5. Business function boundaries view: showing the boundaries of business functions across different actors.

The reason for using only these viewpoints is that they assist in building the relation between the architecture and its higher-level world, that is business model and strategy.

As illustrated in table 2-3, some of the VIP components are translated to more than one Archimate concept. That is because the level of conceptualization in VIP framework is higher than that in Archimate. As illustrated in the meta-models of Archimate layers in section 2.4.2, an Archimate element might be a realization, aggregation, composition, group, or specialization of other elements. This mechanism makes it possible for the architect to decompose an element using other elements or show how the element is created or used, or present a group of elements as another (higher-level) concept. Some of these relationships, such as the relation between value objects, and data, information and knowledge objects, as well as between value activities, information flows, and primary business processes, are already addressed in the VIP framework. Based on the type of the component, its level of granularity, or the composition of the component(s) that are realizing or forming it, a value activity or information flow can be translated into a business interaction, business function, or business process.

It is important to mention that, despite of the similarity in their names, a primary business process is translated into a business service, and not a business process, in Archimate. That is due to their definition that requires their intention to be providing a service or product offering to the customer. Similar to the value activity and information flow that are not linked to only one component, VIP actors also are linked to business actor and collaboration in Archimate. That depends on the nature of collaboration of actors, different actors are mapped to Archimate business actor, but there might be business domains formed from components of more than one actor, or joint legal entities that these will be translated into business collaborations. Also different actors may accept different roles to perform different value activities. Finally, business interactions, business functions, and business processes can be the equivalent of a value activity or information flow. That is based on their granularity and if, in fact, information is moving from one activity to another or from one process to another or not.

Table 2-3 Relating VIP to Archimate

<table>
<thead>
<tr>
<th>#</th>
<th>VIP component</th>
<th>Implication in Archimate</th>
<th>Explanation (definitions from Solaimani and Bouwman (2012) and Lankhorst (2013))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stakeholders</td>
<td>• Organization viewpoint</td>
<td>Stakeholders in VIP are defined as independent economic entities. This component can be translated into four Archimate concepts of Actors, and their collaborations, locations, and roles. Definition of business actor in Archimate is an organizational entity that is capable of performing behavior. Also roles are responsibilities assigned to actors and business collaboration shows the aggregates of two or more roles that work together to perform a collaborative behavior. These actors and roles access business services through business interface. In addition, the views developed from the organization viewpoint can be helpful in translating the information in stakeholder component to the architecture model.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Business actor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Business collaboration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Business roles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Business interface</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Value objects (resources),</td>
<td>• Product</td>
<td>Value objects component of VIP is defined as “money or goods that are valuable to one or more actors”. This definition is corresponding to product and business objects concepts in Archimate. The first concept is covers the collection of services that is offered to the customer, and the second concept is a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Business objects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Passive element that has relevance from a business perspective for other actors.</td>
<td></td>
<td></td>
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<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><strong>Value goals (propositions)</strong>&lt;br&gt;• Value&lt;br&gt;These two corresponding concepts are defined as intentions which should be achieved and the worth, utility, or importance of a business service or product in VIP and Archimate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>Value activities</strong>&lt;br&gt;• Business interaction&lt;br&gt;• Business function&lt;br&gt;• Business process&lt;br&gt;• Business services&lt;br&gt;Based on VIP, an actor performs a value activity for profit or to increase utility. Value activities include offering, receiving, exchanging, or confirming value. Depending on the level of conceptualization, value activities can be translated into one of the four concepts of business services, business interactions, business function, or business process, that are behavioral elements that describe a business collaboration, group behavior based on a chosen criteria, or, group behavior based on ordering activities and their intention. Value activities that deliver value to the customers can provide information about business services.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><strong>Value dependencies</strong>&lt;br&gt;• Actors collaboration viewpoint&lt;br&gt;• Business functions viewpoint&lt;br&gt;• Value activities&lt;br&gt;Value dependencies concept is about how different actors are related to each other through goals, activities, and objects. These relations are in terms of dependencies, which indicate that one actor needs the value object of another. Views developed from the two indicated Archimate viewpoints can be used in showing these dependencies, as well as the activity and business object relationships.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>Information access</strong>&lt;br&gt;• Business functions viewpoint&lt;br&gt;• Actors cooperation viewpoint&lt;br&gt;Information access concept is about access to data, information and knowledge by different actors. The views developed from the business functions viewpoint and actors cooperation viewpoint show the points where actors need to access the information that are possessed by each other.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><strong>Knowledge objects</strong>&lt;br&gt;• Meaning&lt;br&gt;In VIP framework knowledge is defined as information plus processing, or the objects, concepts, and relationships that are assumed to exist in some area. In a similar way, the meaning concept in Archimate is defined as the knowledge or expertise presented in a business project.</td>
<td></td>
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<tr>
<td>8</td>
<td><strong>Information objects</strong>&lt;br&gt;• Representation&lt;br&gt;In VIP framework information object is defined as the result of applying processing on data. In Archimate, the same concept is defined as a perceptible form of information carried by a business object and is named representation.</td>
<td></td>
<td></td>
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<tr>
<td>9</td>
<td><strong>Data objects</strong>&lt;br&gt;• Data object&lt;br&gt;Both VIP and Archimate define it as element (digital recording) that has no meaning by itself but may be stored, processed, and transmitted automatically.</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td><strong>Information flow</strong>&lt;br&gt;• Business interaction&lt;br&gt;• Business function&lt;br&gt;• Business process&lt;br&gt;In VIP framework, information flow is how information flows between actors. Depending on the level of conceptualization, information flows can be translated into one of the three concepts of business interactions, business function, or business process, that are behavioral elements that describe a business collaboration, group behavior based on a chosen criteria, or, group behavior based on ordering activities and their intention. The last concept shows the flow of information, and the other two may show the points that information is exchanged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td><strong>Information dependencies</strong>&lt;br&gt;• Business events&lt;br&gt;The relationship between two actors expressing that one actor should exchange information before the other actor does anything. Using business events as triggers, a behavior by an actor can become dependent to an exchange of information by another actor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td><strong>(Primary) business processes</strong>&lt;br&gt;• Business processes&lt;br&gt;Primary business processes in VIP are the business processes of the first tier actors, or the business processes that are related to value delivery to the customer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td><strong>Business process behaviors</strong>&lt;br&gt;• Business processes&lt;br&gt;Business process behaviors provides information about the process model, therefore, it can be translated into the business processes in different levels of abstraction.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.7.3 Relating VISOR to Archimate through VIP framework

In the previous sections we first illustrated the link between VISOR and VIP, and then showed how we can relate VIP components to Archimate concepts. In the below figures, using the VIP as an intermediary link, the relation between VISOR and Archimate is shown.

As stated before, using VIP framework, it is possible to relate (a part of) VISOR framework to Archimate up to the business processes. In this section it is illustrated how the business layer of Archimate can be designed based on the VISOR framework.

It is important to mention that the linked components may not be similar to or equivalents of each other. Instead, a relation in bellow diagrams indicates that one component can provide certain information about another component. Also, these relations may differ when modeling different services, products, or organizations.

Value component

The value component of VISOR provides information about value, business actor, information related, business object, and behavioral components of Archimate. Customer, or customer segments, is considered as one of the stakeholders in VIP, and the value propositions of service or product offering for them is considered as one of the value goals. The customer understanding, if captured, exists in the organization in the form of data, information or knowledge, and it can be linked to data, meaning and representation concepts of Archimate. Customers can be defined as a business actor in Archimate models. Finally, customer relationship can be translated to a set of value activities performed through a set of channels, which can be considered as value objects.

![Figure 2-12 Relating the value component of VISOR to Archimate](image)

Revenue/cost component

The revenue stream, which is all the points in those the customer pays for a service or product, is in the opposite direction of the value activity through which customer accesses that product or service, and therefore it can be translated to the business functions (i.e. financial handling) or business processes (i.e. collection process).
The financial flows include all flows of money between actors. From these flows, the points that actors have to receive a value object from one another to perform a value activity, and hence they are dependent on each other, can be extracted. Despite of the business functions and processes required for performing and managing those interactions, these financial flows can also give information about the cooperation between actors, and business functions that they should perform alone or together.

**Interface component**

The customer itself can be viewed as a value object in both VIP and Archimate. However, Neither in VIP nor in Archimate there is no specific class of components addressing the interface of a digital service, and therefore, its linkages with other services and devices should be handled separately, as flows of information that may be translated into business interactions between actors. Similarly, if viewing these services and linkages as value interfaces, they can give information about the value activities enabling them and the business functions, processes, and interactions required in order to realize them.

**Service platforms**

The service platform component includes information about the key resources, infrastructure, technology, and the logistical network that enables provision of a service or product. Therefore, it contains direct information about the value objects that flow in the logistical streams, the value activities through which actors exchange those objects, and the dependencies of different actors to the value objects of one another.
**Organization model**

Organization model component of VISOR business model describes the structure of actors and their interrelationships. There should be a consistency between the stakeholder network as described in the business model and the organizational structure as modeled in organization viewpoint. In addition, the value goals that they follow should be realized in values, goals, and motivations models. The organizational characteristic has the role of a supplement for the stakeholder network by describing the characteristics of each stakeholder and their relationships.

The value network provides information about the boundaries of a certain process or function among the actors, different kinds of value objects that are exchanged inside the network, and their flows between different actors. Therefore, the information it provides can help in identifying the roles of actors and their collaborations in performing processes or functions, and creating and alignment between an actor’s value goals, and the value activities that he performs and the value objects that he receives. The key partnership components serve as a supplement to the value network by addressing various aspects of a value exchange. It provides information about the dependencies that actors have to the processes or value objects of other actors, and the functions that they co-perform. Also, the channels describe the ways through which the actors inside the network interact. Failing to realize a channel as a business object may lead to ignoring its role while developing architecture models.

Finally, connected activities, in different levels of abstraction, can provide information about the business functions, business processes, or activities that form a higher-level service.

![Figure 2-16 Relating the organizing model component of VISOR to Archimate](image)

**2.8 Conclusion**

In sections 1 to 4 of this chapter, an answer was provided to the first research question regarding the main components of enterprise architecture and business model. Different views on each of the modeling disciplines and the concepts and components that each include were introduced. Business model approaches and frameworks provide a high level explanation of the firm and the way it does business and deliver value to its customers and partners. Different approaches address different aspects of the firm through the concepts they address, and the way they relate those. VISOR business model tries to aggregate and address all of the components of different approaches. Unlike business model CANVAS it expands further than a single firm, and by addressing concepts such as IT infrastructure or service platform it does not remain in the value level. It tries to cover all components addressed by different business modeling approaches. By basing this research on VISOR, it is possible to relate its outcome to other business models with no or little modifications. For example, e3value model is encapsulated in the organization component of VISOR, by having sub-components such as value network and value activities.

Enterprise architecture on the other hand is aimed at creating value from the firm’s information systems. It describes different components of the firm’s information systems and their
interrelationships, while providing a level of abstraction that eliminates the technical details. Through architectural guidelines and principles, as well as prescriptive target architectures, they try to guide the firm’s IS development in line with the firm’s strategy. However, being originated in an IS basis, enterprise architecture frameworks have kept their focus on IS. Business architecture, on the contrary, is specifically focused on the layer between strategy and information systems. This theory tries to develop alignment between the two layers by organizing IT based on business needs, which in turn is derived from strategic choices. Archimate is a language that has attempted to expand and outreach to the business level, and has tried to include business concepts in its framework. Including business concepts in architecture framework does not suffice to create alignment between the two worlds. However, since application and infrastructure layers of Archimate are very close to technology, a link between these two layers and business model can be made through the business layer. Using business architecture, these subsequent architectures can later be analyzed. The potentials and limitations that they create can also be transmitted to the business model through this intermediary layer.

Section 2.5 provides answers to the second research question regarding the relationship between business model and enterprise architecture. Terminologies such as fit, harmony, alignment, bridging, linkage, fusion, and integration are introduced and, sometimes interchangeably, used in order to describe a desirable state of the mutual position of strategy and IS toward each other. Different lines of theory are also developed in order to reach that state. Borrowing terminology from contingency theory, it could be said that this desirable state is the fit between contextual factors, reflected in strategy, and structural characteristics, covered in architecture. While the theory regarding contingency and alignment form the coordinates of the desirable state, theories regarding business model and business process model, and business model and enterprise architecture alignment touch more specific, and closer to practice, aspects of the issue.

The literature addressing enterprise architecture and business model alignment share a number of characteristics: (1) Inability in addressing all aspects of multi-actor settings such as information exchange or physical, application and process integration (2) Being correspondence relationships instead of conceptual frameworks. None of the mentioned frameworks conceptualize the relation. While some frameworks, such as the mapping of E3value model to Archimate, have tried to address the complexities of business model and enterprise architecture alignment in value networks, since E3value is focused on value transactions, they fail to address more operational issues of those enterprises. In addition, these frameworks are mapping frameworks identifying the correspondence relationships between business model and enterprise architecture. In this sense, they are not able in providing an analytic framework that could help in explicitly identifying the issues, and create a conceptual bridge between the two concepts.

The literature addressing business model and business process model alignment has a similar approach in bridging between the two levels. They provide methods and frameworks for analyzing value, and value object exchanges between actors, and translating those into business processes. In this sense, E3value model has a significant role in all of these approaches. Although they remain in business process level, and does not address different components of enterprise architecture, the methodology that they use could be helpful when bridging business model and enterprise architecture. In addition, business processes are a part of the business layer in enterprise architecture. Therefore, it is possible to use them as a linking point between business model and enterprise architecture. E3value and its concepts, as well as the approaches that these alignment frameworks used, can guide in developing a relationship between business model and VIP framework, as well as VIP framework and Archimate.

A limitation of the existing approaches is that they remain in a conceptual level. Although they provide detailed methods and approaches for creating the link between business model and enterprise architecture, those methods, if applied, are not applied on hypothetical, and not real-life, cases. Therefore their practical use and added-value remains unclear.

It is important to mention that a systematic analysis about different business and IT alignment approaches and frameworks was out of the scope of this master thesis. Here, only a general overview
was performed, in order to identify those concepts and frameworks, or parts of frameworks that could contribute to the alignment approach of the purpose of this master thesis.

In sections 2.6 and 2.7 an alignment approach is introduced, providing answer to the third research question. Different introduced alignment approaches each highlight certain aspects of the relationship between business models and business process. However, VIP framework tries to be an inclusive approach by addressing different aspects of the existing gap, by considering different layers of interactions between actors. Addressing different aspects such as information and information transfer, as well as value, information and business process dependencies makes it possible to use it for a broader scope of business model and enterprise architecture alignment. In addition, it is a generic framework, and it is possible to use it for relating different business modeling approaches with different business process models. Finally, VIP has both descriptive and prescriptive usage. It is an analytic framework and it is possible to use it as a diagnostic instrument for inspecting cases in order to find instances of inconsistency or misalignment. Based on these three reasons, VIP framework, as an approach that reflects and adds on the other approaches, is chosen as the primary means for developing the alignment approach in this thesis. Different introduced approaches, and their concepts, are considered and used when developing the alignment approach of this master thesis.

Within the linkages between the components of the three layers in the alignment approach, there is no direct correspondence relationship. This means that each two related components provide only partial information about each other. As an example, although customer is directly related to stakeholders, it only provides information about a certain stakeholder, which is the customer. In order to identify all stakeholders and their characteristics and specifications, information from key partnership, value network, organizational characteristics, and stakeholder network is also necessary.
3 Research method

In this section, firstly, the reasoning that resulted to the choice of case study methodology is stated. Then, the design of the case study, the case description, then the approach for collecting and analyzing the data are explained, and finally the case study and its results are presented.

3.1 Why case study?

Yin (2002) names the following conditions for choosing the case study methodology: (1) the type of the research question, (2) the amount of control that the investigator has over the actual behavioral events, and (3) the degree of focus on contemporary, as opposed to historical events (Yin, 2002, p. 5).

As stated before, the issue of business model and enterprise architecture alignment is a relatively new issue and there are only a few scientific works addressing this specific issue. The volume of scientific work in this specific scope does not allow a confident claim about the factors affecting the alignment between the two concepts. Therefore, there is a need for exploring the issue. The main question of this research and the sub-question that addresses the practical relevance of the approach are designed as “how” questions, in order to allow further exploration of the issue. Having “how” questions as research questions makes case study a relevant strategy. The case study allows exploring the nature of the phenomenon (alignment), and dealing with operational links that should be traced. Through case study we can gather insight about the reality and use this insight in refining the conceptual relationship developed in the conceptualization part.

The characteristics of the topic of this research, also suite the other two conditions mentioned by Yin (2002). The research is about a contemporary situation of business model and enterprise architecture alignment in the organizations. The issue of alignment is surely a contemporary issue, since the companies develop new business models time by time and need to implement those in their organizations. However, the researcher did not have the opportunity to directly manipulate the design and implementation processes of business models in an organization. Even with having that opportunity given, the manipulation should be done systematically and precisely, that is unlikely to be achievable in a contemporary organization context. While it is not possible to directly, precisely and systematically manipulate the behavior of the organizations under analysis, interviews with the people involved in them can be performed and other ways of gathering information can be found, and this makes case study a suitable research methodology for the topic of this research.

Based on the above reasoning, the explorative evaluation phase of the research is performed using an explorative case study, based on the guidelines for case study design by Yin (2002) and qualitative data analysis by Miles and Huberman (1994).

3.2 Case study design

The case study part of this research is designed as what Yin (2002) calls a single and holistic case study, which means having a single case, in a single context, with only one unit of analysis that is the equivalent of the case. The rationale for this decision was to use a single organization as a typical case, in order to use it to explore the alignment issue in a broader society.

The case study in Yin’s (2002, p. 22) methods consists of five components: (1) research question, (2) its propositions, (3) its unit of analysis (4) the logic linking the data to the propositions, and (5) the criteria for interpreting the findings. However, as Yin (2002, p. 28) explains, the two last are not well defined yet, and the current body of literature does not provide detailed guidelines about them. In addition, the first component, research question, is already discussed in section 1.2, and how its design suits the case study methodology is explained in section 3.1.

The second component of the case study is the propositions. However, since this research is an explorative research, it does not introduce any propositions to be evaluated. For explorative analyses, Yin (2002) suggests stating the purpose of the research, as well as the criteria that can be used to judge
about the success of the research, instead of the propositions. As explained before, the subject of analysis in this research is a phenomenon, business model and enterprise architecture alignment, which must be investigated. Since the contextual factors affect the phenomenon, it should be analyzed inside its context. Therefore, the purpose if this case study is to investigate this phenomenon in a real-life context.

Following Yin (2002) the unit of analysis in this case study is chosen in accordance to the main question of the research. This main question emphasizes the relation between enterprise architecture and business model. In this research, the focus is on one actor, while awareness about its interactions with its partners is maintained. Therefore, the unit of analysis in this case study is a project, in which more than one organizational unit are collaborating, and also, the alignment phenomena can be analyzed. Consequently, in addition to the unit of analysis, level of analysis will be the organization that is collaborating with its partners to deliver the project. Also the unit of observation is the individuals engaged in the project in both business model and enterprise architecture sides.

The criteria for selecting the case were derived from the research questions. For this case study we needed a firm operating in a multi-actor setting, with value dependencies to other actors in that network. Value creation in the network should happen by multiple collaborating actors. In order to analyze different levels of abstraction, there was a need for having different independent strategic and operational roles and responsibilities, being focused on business model and enterprise architecture development.

3.3 Data collection and analysis

This case study is exploratory, semi-structured, on a single case, and is performed only using qualitative analysis. In line with Miles and Huberman’s (1994) approach, qualitative data collection should be bounded based on the relevant theories. Based on their guidelines about within-case sampling, sampling is designed in accordance with the main research question. The main research question of this master thesis has three elements. These elements are business model, enterprise architecture, and their relation. In order to address these three concepts, interviews will be performed with correspondingly: (1) business strategists, (2) enterprise architects, and (3) the lead architect, that has the role of a mediator between business strategists and enterprise architects, and another senior information officer. Also, in order to follow the “iterative and rolling quality” (Miles & Huberman, 1994, p. 29), which means the data collected from samples may lead to selection of new samples, follow up interviews with the same people or other relevant roles may be set. In addition to the interviews, other sources of data such as organizational documentations or the company’s website will be used, in order to “converge data in a triangulating fashion” (Yin, 2002, p. 14).

The questions of the interviews differ based on the role of the interviewees, in order to suite their expertise, their responsibilities, and their frame of reference. For each role, the question is formulated in a way to look more relevant to the interviewee, or different questions are designed in order to ask about an aspect of the issue that is relevant to him.

There are four categories of questions. The first question is an introductory question asking about the interviewee’s background, his current role in the organization, and the recent tasks or projects that he has worked on. The second category of the questions addresses the first element of the research question that is business model. The intention for these questions is to receive an overview about the business model and the process of business model design in the company. The answers to these questions will be translated to the business model of the company. The questions in the third category are aimed to explore the situation regarding business model implementation and the existing state of the communication between business model designers and architects. Finally, the questions in the enterprise architecture category address the architectural design practice in the company, and the architectural design process. The questions in business model, alignment and enterprise architecture categories will also help in developing the components of the VIP framework, and relate the business model to enterprise architecture. In addition to the mentioned intentions, the questions in second and
fourth categories also try to evaluate the mutual perceptions of strategists and architects about the fields of each other’s.

The interviews were performed during April and May 2013. The average interview time was one and a half hour. The roles, acronyms, and organizations of the interviewees are provided in table 3-1. During the interviews, the questions were briefly explained to the interviewee in order to adjust the definition that they have from different terminologies, such as business model, with the definition that is used in this research. During the interviews, notes were taken about the attitude of the interviewee, and his emphasis on different topics.

Business model and VIP models of the firm are the result of collective discussions with interviewees. After the preparation of a basic design by the researcher, the business model and VIP model of the firm were reviewed with multiple interviewees and were revised based on their input. This was happened in collective sessions, and the discussions during the revisions were also coded and used in the analysis.

All the interviews, both the interview part and the collective discussion about the VIP model part, were recorded, and the recordings of all of the interviews were transcribed. The raw data, such as field notes, collected during the interviews, are processed and turned into write-ups, which can be used by qualitative data analysis methods. The data is then systematically analyzed following Miles and Huberman’s (1994) approach. Based on a primary list of codes, a list of quotes, addressing business model, enterprise architecture, and their alignment characteristics encapsulated in VIP framework, are selected. The documents received from the company, as well as the open information regarding the company, were coded respectively. In accordance with the coding approach of Miles and Huberman (1994), three master codes of business VISOR, VIP, and Archimate were selected. The sub-codes then address the components of each of the above concepts in order to address different aspects of business model, VIP framework, and enterprise architecture. In line with Miles and Huberman’s (1994) guidelines, the coding was reviewed by one of the supervisors in order to increase objectivity. The detailed coding is provided in appendix 3.

Table 3-1 Roles of the interviewees, their acronyms and their corresponding organizations

<table>
<thead>
<tr>
<th>Role</th>
<th>Acronym</th>
<th>Number of interviews</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Head of strategy</td>
<td>HS</td>
<td>1</td>
<td>Pension administration</td>
</tr>
<tr>
<td>2. Business strategist</td>
<td>BS</td>
<td>1</td>
<td>Pension administration</td>
</tr>
<tr>
<td>3. Senior business consultant</td>
<td>SBC</td>
<td>1</td>
<td>Insurance company</td>
</tr>
<tr>
<td>4. Lead architect</td>
<td>LA</td>
<td>2</td>
<td>Pension administration</td>
</tr>
<tr>
<td>5. Senior enterprise architect</td>
<td>SEA</td>
<td>1</td>
<td>Insurance company</td>
</tr>
<tr>
<td>6. Enterprise architect</td>
<td>EA</td>
<td>1</td>
<td>Insurance company</td>
</tr>
</tbody>
</table>

In the analysis phase, the sets of codes corresponding with each code where analyzed based on the developed approach. The quotes regarding the components that where related in the alignment approach where analyzed in order to identify misalignments, inconsistencies, and other potential problems.

3.4 Data analysis based on the alignment approach

The first step for using the alignment approach is to develop the three levels of business model, VIP and enterprise architecture independently. In many company’s the business model and enterprise architecture models are already developed and documented. If so, the existing models will be used. If the models are represented in models other than VISOR and Archimate, they will be translated into these two frameworks. If business model and enterprise architecture models are not developed and documented, they must be developed first. This can be done through interviews with people in the two levels of business strategy and enterprise architecture. In developing the business model, the only
source is business strategists, and in developing enterprise architecture, the only source is architects. Therefore, inconsistency between the two models is expected. The VIP model reflects the critical elements of the reality of the company, and the way business is being done in different layers. The VIP model is developed by the researcher and discussed with multiple interviewees, in order to assure that it is accurate, and contains all critical aspects of the firm’s activities.

After completing the three models, the case will be analyzed in three layers of value, information, and processes. This is in correspondence with VIP layers. For each VIP component, or layer, the corresponding components in both business model and enterprise architecture side will be identified and checked for potential issues or inconsistencies. As an example, the business model components that, together, form the stakeholders’ network of VIP are stakeholder network, organizational characteristics, value network, key partnerships, and customers. As explained in the previous section, each of these components provides some information about the stakeholders network, as explained in VIP. This component, then, should match business interface, role, actor, and collaboration of Archimate. In addition, the views from organization viewpoint need to have correspondence with this component. Therefore, the relations to both business model, and enterprise architecture sides can be analyzed and the issues will be detected.

Figure 3-1 Using the alignment approach to identify issues.

The above figure provides a summary of the steps of the alignment approach, and the components of the three concepts, as well as the data that should be used for developing them.

3.5 Conclusion

The goal of this master thesis is not to provide a systematic literature study in business model, enterprise architecture, and their alignment approaches. However, a broad overview of the literature, as provided in chapter 2, could be helpful in identifying the main components, characteristics, and limitations of different approaches. In this way, the subject of this research will be positioned inside the existing body of knowledge, and its value will be identified. Moreover, this broad overview helps in developing a set of criteria for selecting business modeling and enterprise architecture approaches that the alignment approach of the subject of this master thesis will be built on them. The next phase of this research is a case study, intended to assess and improve the practical relevance of the developed alignment approach.
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<td>Source: Interviews performed with architects and business strategists, and senior information officers in the pension administration. Structure: Case study research guidelines by (Yin, 2002)</td>
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4 Case description and analysis

In this section, the case is described in different levels of analysis, based on the information available in the website of the insurance company, and the pension administration, the interviews, and the documents received from the insurance company.

The case under analysis in this study is the strategic restructuring of an insurance company. The company operates as a part of a corporation. On one hand, it has to perform value transactions with actors and shares information flows with them, such as pension funds, social partners, and banks, outside the organization. On the other hand, the company is divided into totally independent business units. Since the pension administration and its partner provide two complimentary services, there is no value conflict between them. However, there are disagreements about the priority of the value goals, as well as taking certain choices by the insurance company. In addition to those, the pension administration’s enterprise architecture unit has a supervisory role when it comes to the business units. In terms of enterprise architecture, each business unit has its own enterprise architecture units. Business strategies are also defined in two levels of corporate level and business unit level, and the two strategist levels, despite of being in close contact, operate independently. Due to the market fluctuations, the strategic position of the insurance company is re-defined, and the enterprise architecture of the company is being revised in order to implement those changes. Two levels of strategy and architecture groups define the strategies and architecture in the company. In the corporate level, there is an architectural group containing more than 30 architects, as well as a group of corporate strategists. In the company level, again, there are business strategists, and enterprise architects who develop the strategic directions and the enterprise architecture models of the company specifically addressing the company.

4.1.1 Business model (VISOR) of the case

In this section, the business model of the insurance company is described based on VISOR business model components. The source of the information in this section are the interviews, the business model CANVAS of the insurance company, and the publicly available information about the insurance company and other stakeholders.

Organizing model

The insurance company operates in an interrelated network of actors and stakeholders. It is a part of a pension administration company, and it shares stakeholders and resources with that, as well as the pension funds related to different sectors of economy. It uses the resources and capabilities provided by the pension administration. However, due to some sector regulations, the share of resources between the two companies is limited, and the insurance company and the pension administration must maintain independence when it comes to certain resources such as the information related to the employees that the pension administration handles their pension administration.

Channels: The company uses two different channels for reaching the employees and the employers. For reaching the employers their channel is personal contact with the employers in each sector that the company serves. For reaching the employees, they use a customer portal.

Organizational characteristics: Profit is not the only goal of the company. Its contribution to the strategy of the pension administration is to serve as a complement to what it offers. Therefore, its strategy is to reach and cover the customer base of the pension administration, while maintaining a fair profit. It can cancel the fluctuations of the first and second pillars of pension having the intention of helping the customer and making only a fair profit, and in this way it strengthens the position of the pension administration in the market.

Key partnership: For the insurance company, IT business unit of the pension administration is a key partner because it provides IT resources. The company also has other IT partners who co-develop the front office information systems with them. This use of resources happens also in the marketing and asset management business units of the pension administration.
**Stakeholders network:** Except for the pension administration and its business units (asset management, marketing, risk management, and IT), pension funds, employers, and employees in the sectors that the company serves also stakeholders in the company. Employers and employees are considered as stakeholders because directly or indirectly they are the customers of the company’s products. The pension funds are considered as stakeholders because they need the insurance company to create a balance between the second and third pillars of the pensions in the industries that they represent. In addition, there are shareholders that possess shares in both the pension administration and the pension funds. The stakeholder’s network of the company is presented in figure 4-1.

In this figure each rectangle represents a stakeholder. The arrows between the stakeholders represent different ways that they are related to each other. Also, similar stakeholders are grouped by using the same colors. The green color shows the pension administration and its business unit. And the blue color shows the insurance company. Light blue brown blocks are the two kinds of the customers, and the dark blue block shows the governmental organizations.

![Figure 4-1 The stakeholder network of the insurance company](image)

**Connected activities:** The activities of the insurance company consists of insurance risk analysis, market analysis, product development based on the results of those activities, reaching the customers through channels, delivery of insurance products and support through the customer portal, managing the assets.

**Value network:** The value network of the company is as presented in figure 4-2.

In this figure each rectangle represents an actor, and arrows represent exchange of tangible and intangible assets between them. The actor at the beginning of the arrow delivers the value indicated along the arrow to the actor at the end it.
Figure 4-2 Value network of the insurance company

Service platform

As an insurance company data, information, and knowledge in their different forms are critical for the company. However, the firm’s activities are not technology intensive. The use of technology is limited to IT in their front office, back office and CRM systems.

Key resources: The key resource for the company is the information about the employees in the sectors it serves. Using that information the company can suggest them relevant insurance products. In addition to that, another key resource is information about market, which helps them to develop relevant products. Having personal connections as a main channel, the contact to the employers in different sectors is also a key resource. The knowledge built on this information in different domains, and the human resources who make processing and analyzing this information possible are other key resources. The policy administration system and customer portal are other key resource. Finally, the assets of the company that the profit of their investment contributes to a significant part of the company’s profit, as well as the human resources and capabilities related to those, are other key resources.

IT infrastructure: A policy administration system is the core of the IT infrastructure of the company. It has connections with the customer portal, the back office systems, and a content management and an archiving system.

Logistical stream: Having information as its main resource, the company receives streams of information from the government, pension funds, the employees, their employers, and the pension administration. This information is related to the employee’s financial situation, the first and second pillar pensions that apply to him, and his contact.

Technology: As an insurance company, the activities are not technology-intensive, and the use of technology is limited to ICT.

Core technology investments: The core technology investment of the company is the policy administration system that they have specialized for the company together with an IT vendor.
Interface

The services of the company are delivered to the customers through a customer portal. This portal has different linkages with internal and external sources. However, it does not use any external service.

*Customer interface:* In order to acquire and maintain the customer, the company uses a customer portal that recommends the combination of insurance products that best suits his needs. The portal does that by putting different streams of related information together. The customer can then purchase the products through the portal. The portal is being developed in the IT business unit of the pension administration, under the full management and control of the insurance company.

*Services and linkages:* The portal works on the backbone of the policy administration system. Through that, it is related to back office, content management, and archive systems. It also receives information about the insurance products, and different pensions that a customer receives through an inter-organizational bus.

*Value interface:* The value exchanges are between the insurance company and the government, and the insurance company and the pension funds. They feed the information regarding the state pension (AOW) and the collective pensions that a customer receives into the portal, so it can find the best suitting products for him.

Revenue model

The revenue/cost model of the company is similar to any other insurance company. The details of the company’s revenue model are out of scope of this research, and therefore are not considered here.

*Revenue stream:* The company has two main revenue streams: insurance premiums and the return on the investments of its assets. The employees also pay the company to receive consultancy, but this is smaller than the other two.

*Financial flows:* The financial flows are from the employees to the company. The company pays asset management, marketing, and IT for using their resources. Also they pay their external IT vendors. The company also pays the customers based on their insurance policies.

*Financial model:* The risks in the company’s financial model are insurance risk and investment risks. Its main cost elements are the human resources, and after that information systems.

*Financial aspects:* Operating in a sector with constantly changing regulations, the company has to comply with different financial regulations. Two main categories of those are related to the company’s liabilities, and the risks it can take in its investments. It is important because with a risk taking attitude and maintaining low liabilities the company may be able to declare positive profit over a period of time. However, it causes fluctuations between different years and that is not desirable for the pension administration and its shareholders.

Value proposition

The company is a niche player and is limited to the customer base of its mother organization.

*Customers:* The customers of the insurance company are the employee and employers in the sectors that the pension administration serves.

*Customer value:* Customers value receiving insurance products tailored to their needs, with a price lower than other insurance companies because of receiving these products in a collective way.

*Customer understanding:* Customer understanding about the pension administration, as well as the insurance company as a part of it, is that they try to make a fair profit by selling only relevant products to customers. The pension funds have a good reputation and customers trust them. This gives the insurance company a positive image when operating as a part of them.

*Customer relationship:* The customer relationship is in person, through meeting the employers, or online through the customer portal.
4.1.2 Developing the VIP diagram of the case

The VIP diagram (figure 4-3) shows information and value exchanges in three levels of value, information and business processes. The process of drawing, as well as the resulting diagram, are used for identifying the issues using the alignment approach. In this diagram, the blocks represent the stakeholders, value objects, information objects, knowledge objects, and business functions and processes, depending on the level they stand in. In the stakeholder level, the brown color represents external actors, blue represents the insurance company, and green represents other actors inside the pension administration. In other levels, blue represents the objects or activities owned or performed by the insurance company, and green represents those owned or performed by the pension administration. In these levels, orange blocks represent those objects or activities that are jointly owned or performed. The arrows represent value activities, and information flows, or composition relationships. The object at the end of the arrow is subordinate to the object in its beginning, in this sense that action is being performed on it, it is being used, or it is owned by the object at the beginning of the arrow. At the top of the diagram, all of the goals of different actors are listed, and the small colored blocks show that which class of actors has each goal.

In the value level, the stakeholder network is designed based on the characteristics described in the business model. The value objects are individual and collective products, which are a simplification of four main product schemes that the company offers (individual, semi-individual for employees, semi-individual for employers, corporate). Policy administration system and customers’ portal are both the service platform over which the insurance company operates. The customer portal also serves as the channel for communicating with the customers. Insurance company’s assets contribute to a large bulk of its profit and are the company’s main value object. In addition to that, sector managers, and risk analysis capabilities are conceptualized as value objects in order to show their role in providing knowledge to the company or contributing to company’s activities.

In the information level, the information and knowledge that are gathered and accumulated through actors or company functions are presented. Although the pension administration has access to the information of the employers and employees who have pension contracts with it, but due to the strict regulation about pension and insurance business independence, they cannot provide that information to the insurance company. Therefore, the only source of the insurance company for accessing those is receiving them directly from the customers or obtaining their approval for accessing their information in the pension administration’s database. The employee or employers access the portal and provide, or confirm the access of, information through that. This information is later used for calculating the employees' financial status and providing him a product suggestion that fits his needs. For suggesting a suitable product to the customer, there is also a need for having the information about the products. Due to the complex nature of the insurance products (different products have three levels of clusters, coverage types, and product modules, and different combinations of different levels of different products are possible) this information can be considered as a valuable information for the company.

Despite of the regulations, there are bodies of information and knowledge that the pension administration can share with the insurance company. There are no restrictions for providing the contacts of the employers and their social contacts to the insurance company. The insurance company uses these contact information for approaching the employers for selling collective products. This information, as well as general knowledge about the sectors and the economic conditions of each that might create an opportunity for the insurance company, are provided by the sector managers, inside the pension administration. The marketing department of the insurance company also provides the knowledge about the market trends, and the asset management unit provides information about the regulations that is used by the insurance company.
Figure 4-3 The VIP analysis of the insurance company
Finally, in the process level, only primary business functions and processes are included. However, among the support functions and processes, only asset management and compliance functions are included, due to their importance and shared resources that they use. Knowledge management function only manages the provisioning of sector knowledge to the business units. Marketing function is responsible for reaching and acquiring customers. Campaign management is responsible for marketing campaigns as well as a sector approach campaign, through which the pension administration and the insurance company target a certain sector. For approaching sectors, marketing communicates with the relationship management function, that despite of its customer relationship management responsibilities, has the contact information of the employers. In research and development function, markets are analyzed using on a variety of available information, and products matching market conditions are developed. The sector knowledge is provided to the market research function through the knowledge management function.

4.1.3 Enterprise architecture model (Archimate) of the case

In this section the existing enterprise architecture models and practices inside the insurance company are explored. The analysis is performed in three layers of business architecture, information architecture and application architecture. These models will be used in identifying issues using alignment approach.

**Business architecture**

The company is composed of a number of corporate units that work under the corporate management (the pension administration group). Four of these business units (asset management, marketing, ICT, and the insurance company) are considered as independent business units. The insurance company, as well as a joint venture between the company and an external company (the premium pension institution), operate as completely independent companies.
Figure 4-4 Business collaboration viewpoint (retrieved from the insurance company’s documentations)

Inside the insurance company, there are only two levels of management. The higher-level includes director of operations, managing director, and financial director.
The main goal of the company is set to be increasing shareholder value. Compliance with laws and regulations, as an essential requirement for the company’s activities, is also set as a main goal. Two drivers for reaching the main goal are revenue growth strategy and product strategy, that each has its own subsequent goals.

The company has seven primary functions, being research and development, marketing, sales, policy administration, claims, relationship management, and asset management. Figure 4-7 presents the primary functions of the company and the organizational roles responsible for them.
Application architecture

The main application components in the company are the customers’ portal, and the generic policy administration systems. The customers’ portal is the core of the company’s marketing activities, and the generic policy administration portal is the core of company’s operations. Some applications components such as employers’ relationship system, used by relationship administration, and the collection systems, and pension administration (MC) collection have also links to the pension administration.
Figure 4-8 Business functions and application components (retrieved from the insurance company’s documentations)
4.2 Applying the alignment approach to the case

In accordance with the coding approach of Miles and Huberman (1994), three master codes of BM, VIP, and EA were selected in order to address different aspects of business model, VIP framework, and enterprise architecture, respectively. The sub-codes then address the components of each of the above concepts.

Following the steps 1 to 3 in section 3.4, firstly, the codings were used for developing business model and enterprise architecture components, and the VIP model. For each VIP component, the quotations related to the corresponding business model components, and the quotations and models related to the corresponding enterprise architecture components where selected. Then these two sides were compared and critically analyzed in order to identify the potentially problematic issues. This was done for every VIP component in accordance to steps 4 to 15 of section 3.4.

4.2.1 Value level issues

Inconsistency between goals of the insurance company, and values of other actors

Although the insurance company is a for-profit company, its only value is not profit maximization. That is due to the specific relation between the insurance company and the pension administration. For the pension administration, the value of insurance company is both profitability, and contributing to its mission that is providing affordable pension solutions to its customers.

[1] “The insurance company does not have a profit maximization objective. The insurance company objective is more on contributing to the mission of the pension administration in supplying affordable pension solutions.” (HS)

The pension administration views the insurance company as a backup for decreasing the effects of the pension market fluctuations on the company and its customers.

[2] “Once the collective system erodes and becomes much less because of a number of factors, for the pension administration group it is good to have a backup, and that backup is The insurance company.” (HS)

The role that the pension administration envisions for the insurance company, is being able to remove the effects of inclining second pillar pensions. Being close to the pension business has also created a high trust environment between the insurance company, and clients, pension funds, and pension administration.

[3] “Because if things cannot be repaired anymore in the second pillar they at least have a company named The insurance company that is close to the pension business that in a high trust environment ensure that it is not in for the profit and the money and what so ever it is dedicated to their needs. So that is why The insurance company is interesting for both the pension administration and the clients that we serve.” (HS)

This complementarity value holds not only for the pension administration, but also for the pension funds who are other stakeholders of the insurance company.

[4] “The pensions are still becoming smaller and smaller. So we promised to the pension funds that the insurance company will work without a profit objective, only to sell to the customer what is best for them. So, the insurance company is an insurance company, but it is a part of the propositions of the pension administration.” (LA)

To enforce the desirable complementarity, the insurance company must first acquire a higher share of the customer base of the pension administration as customers for its insurance policies.

[5] “If you look at the number of people that have insurances from the insurance company, and are the pension administration’s customers, there is a big difference between those two numbers. The insurance company has only acquired around 10 percent of the pension administration
customers. Then marketing and product development has to play its role in convincing people to buy insurance products.” (HS)

Despite of the urgency of increasing customer base, in the goal three of the insurance company there is no goal or concern directly addressing that in any level of goal hierarchy, and therefore, no principle derived from those goals. Although strengthening market position is defined as a goal, but it is operationalized only in terms of the quality of services, customers receiving the services that they need, and not in terms of growing the size of the customer base.

In addition, although based on the interviewees’ statements profitability has a lower priority than creating the complementarity effect with the activities of other stakeholders, the higher-level goals are only financial goals. The stakeholders and their values, as an important determinant for company that operates in a networked organization and has to fulfill the interests of its stakeholder network, is missing from its goal three.

Hidden disagreement about the source of value of the products

Another instance of the value inconsistency between the business and operational level could be observed in product development strategies. There seems to be a disagreement about the main source of value of the products, as a value object in the network, and hence, the product development strategies. In strategy level the head of strategy and business strategist highlight the need for individual products tailored to the needs of the customers. They believe that due to the market changes the need for individual products may increase in the future. In their view, this increases the need for individual product schemes that directly address the needs of specific groups of customers.

[6] “There is a quite large policy change coming up in the Dutch pension sector. Which might significantly increase the need for individual products, and currently AP provides more or less collective products to do their business. And when the need for collective schemes goes down, there will be a need for individual scheme.” (BS)

The corporate strategists highlight the importance of understanding customer needs and turning them into relevant products. They know this as a critical process for the insurance company.

[7] “As being a niche player, anything to do with understanding client needs and turning those needs around to valuable products, so the front office of The insurance company, I think that is a critical process.” (HS)

However, in the operational level, product complexity is considered as an undesired cost factor. Therefore, creating a set of generic and flexible products, reducing product complexity, and offering packages instead of individual products are set as the product development strategy.

[8] “So you have to have flexibility within your products, because then when each company comes and says that well, we want to fill these holes, what you would like to do is not to sell those individual products, but to sell the package. So the product model is mostly about combining those individual products. And what they will do is to tell them that, well, if you take this package then your income is secure.” (SBC)

[9] “We want to make the product models more agile and flexible.” (LA)

It can be seen that while in the business model level the value of the products is believed to be in being specific to customers’ needs, in operational level it is believed to be in being generic and flexible.

Missing collaborations

The other potentially problematic issue is the difference between the composition of different actors and their interrelationships in the architecture models, and that in the stakeholder network as described in the business model. The insurance company operates in a complex network consisting of the pension administration, corporate business units, pension funds, employers, and employees.
“The insurance company itself is very thin, and from the point of view of the insurance company, the main business units within the pension administration are key partners, because they do all the payment transactions, they do all the asset management activities, ICT related activities, marketing activities, and distribution. And what remains is the client administration itself for the insurance policies that is within the insurance company.” (SA)

This complexity should be captured and reflected in the architecture models, in order to enable the insurance company to manage its relationships and gain benefit from them. However, stakeholder network and business collaboration model does not have correspondence. Although marketing, asset management, and IT business units are three equivalent business units providing services to the insurance company, in the business collaborations model they are modeled differently. The main difference is asset management that is modeled as a business unit that does not have any collaboration with the insurance company. That is while some of the interviewees have addressed the collaboration of the insurance company with the asset management business unit.

“There is a big use of resources of the pension administration by the insurance company, when it comes to specific marketing communication skills, asset management, risk management.” (HS)

“If you look at the insurance company it is an insurance company, so they have to partly deal with the pension administration as the pension fund. Partly with different parties within the pension administration, like financial reporting, asset management and risk analysis.” (SBC)

“We partially do their assets, but they have their own asset managers and they also partially outsource it to other providers.” (BS)

Because of these inconsistencies, the value dependency of actors to each other might be neglected in realizing the business model. Also, the structure for performing the missing collaborations will be missing as well, that may affect their efficiency and effectiveness. Neglecting these value dependencies has affected resource sharing and co-performing business functions.

Inconsistency between value goals and planning for value objects

The other problem in the value level is regarding the marketing channels, as value objects. There are two channels for reaching customers: one for reaching employees and one for reaching employers. The channel for reaching the employees is a customer portal that is clearly defined as a value object. However, the latter channel, for reaching the employers, is missing from the architecture models. It can only be tracked as isolated application components. Although its importance is not less than the other channel, since it is not realized as value object, the responsibility over it is unclear. Formerly, the pension administration had direct responsibility over this channel, but after migration of the commercial parts of marketing to the insurance company the pension administration provides help using the sector managers, and through sector approach campaigns.

“So, it is also where the role of the sectors manager comes in. They have a closer relationship to the institutional side of the business, like social partners of pension funds, and managers, and that is something that we could leverage in helping The insurance company.” (HS)

“They have what they call a sector approach. For instance in the construction branch, they try to target a sector, construction sector, with pension as well as insurance people.” (SBC)

However, this marketing channel is not implemented in the architectural models of the insurance company. Although collective schemes have a higher value for the insurance company, their major investments are in the customers’ portal, that its main intention is reaching the individuals. For selling collective investments they should try to reach employers, but that channel does not have any role in the future architecture of the insurance company.
4.2.2 Information level issues

Information redundancy

The enterprise architect of the insurance company mentions several instances of information or data redundancy inside the insurance company, as well as between the insurance company and the pension administration. These redundancies are partly due to architectural issues and partly due to the related regulations that enforce total separation of the pension administration’s and the insurance company’s data. One example of those redundancies is the customer contact information data that has become problematic for relationship management.

[16] “Due to having many instances of information redundancies, relationship management has become problematic.” (EA)

However, there could be found redundancies caused by separation of the marketing functions between the insurance company and the pension administration.

[17] “We had that marketing unit, so we have several sources of information, so that is the redundancy that we need to remove. At the moment, it is working fine, but it is not a wise way.” (EA)

[18] “The two marketing functions in the insurance company and the pension administration are like two separate companies. Everything is doubled.” (EA)

The meaning of having data and information redundancy in a certain domain is that there exists duplication of effort in that domain. There are activities and resources wasted for gaining the information that is already acquired.

It is important to mention that information redundancy is not necessarily an issue and can be used for increasing the accuracy of the data or analysis. However, the issue should be analyzed, the valuable redundancy points be maintained and used, and the unnecessary redundancies be removed.

Not realizing structures for sharing knowledge in architecture

Although the insurance company and the pension administration have to maintain independence by law, there are different bodies of knowledge that exists in the human resources of the pension administration, and there is no legal limitation for sharing those.

[19] “The main element in the knowledge transfer is sector knowledge. So in the pension administration we service different sectors, and it is about knowledge in those sectors, so generally what is happening in the civil sector, what is happening in construction sector, and knowledge about the pension deals in those sectors, so how is the pension deal changing, how is it shifting in a specific sector, as different sectors make different choices in their pension deals, and how does it affect the position of participants in that sector. What could be suitable solutions to help employers and employees in that sector? So it is the product base pension deal information sector information I think that is where the intersection is between The insurance company and the pension administration.” (HS)

[20] “An example of critical knowledge exchange is the knowledge about the government policies which the pension administration has it and The insurance company wants to use it.” (SBC)

There are already mechanisms for sharing knowledge between the insurance company and the pension administration. In the strategy level, the strategists assume that knowledge sharing happens in the company in structured or unstructured ways.

[21] “There is also the knowledge center that The insurance company can use. However, that is publicly available... We have the knowledge center. They are trying to expose that knowledge. A part of information in the knowledge center is also of a type that won’t be disclosed to other parties. That knowledge is related to marketing issues such as the directions that we have to go. I think there is some information that others don’t have.” (SBC)
There is a lot of knowledge transfer between The insurance company and the pension administration, so I think that is already working quite well. We have this group inside The insurance company that is The insurance company knowledge consultancy, they also talk to not only the sector managers of the pension administration, but also directly to employers of the sectors that the pension administration works for.” (HS)

However, when it goes down to the operation level, it is more likely that the assumptions of the strategists do not match the reality. Knowledge management in architecture models of the company is only limited to sector knowledge. It is only defined as a business function, and application components that it may use and its structure of gaining and sharing knowledge are not realized. Also, its activities are only limited to sector knowledge. The effect of this failure in operationalizing knowledge transfers in a structured way can be seen in a concern stated by the lead architect about ineffective knowledge sharing in the company:

“You could still see silos inside and outside business units. So for example the product development people do not communicate their ideas with the operation people. And when operations have changed it is not communicated to the sales department.” (LA)

“We currently use data warehouses and data marts, but when it comes to knowledge sharing I cannot think of any specific structure.” (LA)

The enterprise architect of the insurance company also does not see any structure for knowledge sharing in the company.

“There is currently no structure for sharing that knowledge, and that is something to think about in the future. Because at this moment, people are saying that the pension administration is providing also knowledge through some staff. But it is not structured. It is through emails or personal contacts or etc.” (EA)

“The sector managers provide the information about the social partners and employers. When there is a new government policy, or something like that, and the insurance company has a new opportunity for selling the products. It is provided by email, personal contact, phone, etc.” (EA)

The exchange of knowledge as a value object is neglected in the architectural models. Consequently, the dependencies of different business units that need to have access to this knowledge and the added value that it can create for them is neglected. Failing to realize and implement the knowledge transfers that are foreseen in the business model may affect its viability. There may be operational problems, or legal restrictions, that does not allow the knowledge sharing as described in the business model. Those potential problems can be identified only when structures for sharing the knowledge are designed.

4.2.3 Process level issues

Ambiguous business function decomposition

In the strategy level, head strategist and senior business consultant, believe that there are collaborations in marketing function between the insurance company and the pension administration.

“The relation between the pension administration marketing and The insurance company] is not fully cut-off.” (SBC)

“But they do not want to operate totally independently in marketing, they want to have a bit more grip on their commercial responsibility, so anything that has to do with channels, and communication, they want to have direct steering. So it is not about separation from the pension administration, just gaining a bit more control on the channel side and commercial side of their business.” (HS)

However, in the operational level, business architectures do not see any connection between the marketing function of the insurance company, and that of the pension administration. In fact, they view them as two totally separate functions.
“Among the marketing sub-functions, market research was already in-house, but sales and marketing were outsourced, a part of it now is gone to the pension organization, and a part of it to the insurance company. In the current setting marketing for insurance is done by the insurance company and marketing for pensions by the pension administration and there is no collaboration between the insurance company and the pension administration regarding the marketing function.” (EA)

“The relationship between the marketing of the insurance company and that of the pension administration is totally cut off. Now we do marketing inside the insurance company… there is not any relation between the marketing in the insurance company and that in the pension administration. Also, they do not share any resource.” (LA)

As could be seen, there is ambiguity about the arrangement of the marketing function between the strategy level and the operational level. This ambiguity in definition, in turns, may lead to ambiguous allocation of responsibility over marketing activities and can decrease efficiency.

Not well-defined collaborations

Although the company and the pension administration perform a number of business functions together, these co-performed business functions are not translated into operational levels. As an example, their collaboration in performing the marketing function is addressed in the business model. However, based on the company’s business function models it is only performed by the company alone. Only in actor collaboration viewpoint there could be found a sign indicating that the resources responsible for performing those functions are shared between the pension administration and the insurance company. However, one of the interviewees mentioned the exact activities that they perform together, and application services that they are needed can be identified based on those.

“In marketing] have what they call a sector approach. For instance they try to target construction sector, with both pension (pension administration) as well as insurance people.” (SBC)

This shows that the campaigning activities of the marketing unit are done jointly, or at least in close collaboration with, the pension administration.

“Institutional business development is still at APG side. So, we have marketing at the customer level that now is inside the insurance company, but marketing at sector level is still being done by the pension administration.” (LA)

Based on these statements the separation of the marketing function between the insurance company and the pension administration is only in the commercial parts. In this setting the insurance company has full control over the customers’ portal that is the primary channel for reaching the customers. The insurance company and the marketing company perform marketing intelligence, campaigns, and other marketing functions together.

Not indicating the exact functions and sub-functions that are co-performed, as well as their required resources and responsible roles, leads to not realizing those links in the process model, and not having an structured way for performing those functions. This may cause inefficiency and resource loss due to unclear responsibility over these activities. In addition, there may be operational problems, or legal restrictions, that does not allow the co-performing these functions as described in the business model. Those potential problems can be identified only when these functional collaborations are realized in the architecture.

Lack of process integration

Selling collective products to employers, instead of individual products to employees, has a higher profit margin and is the priority for the marketing department.
“And institutional business development is important because the vision is to first try at the highest level, and then if it was not successful try at the sector level, and then to employers, and finally, at the employee level.” (LA)

This happens through marketing campaigns through those the insurance company and the pension administration approach employers in sectors for selling insurance and pension products. However, these two processes are not integrated.

“The process of approaching employers in the insurance company, and the process of approaching them in the pension administration are two separate processes. They are not integrated, and the sector managers work like a human link between these two. Integrating these two processes is what we should reach later” (EA)

The gap between the insurance company and pension administration process is not limited to marketing processes. In risk management processes, again, there is a human link between the risk management processes in the insurance company, and control processes of the pension administration.

“The insurance company is doing risk management processes, and the outcome of those processes is the input of risk management processes in the pension administration. The pension administration has to report about the subsidiaries. There is always information exchange between the pension administration and the insurance company but it is done by humans.” (EA)

The same situation, in another form, exists in the asset management function, where the control processes are executed within the insurance company, while the operational processes in the pension administration, and there is no automated link between them.

“The asset management processes are done mainly by the pension administration, but we make the decisions about in which funds we want to invest in the insurance company. So we have a little bit of the business processes insource...They get some help from the pension administration. But their link is not automated.” (EA)

All of the three domains are related to primary activities of the insurance company. Lack of integration leads to reduced ability in monitoring and improving the processes. In addition, since the data related to insurance company processes is stored and owned by the insurance company, and the data related to the pension administration processes is stored and owned by the pension administration, reduces the ability of analyzing the data and extracting meaning from it.

4.3 Discussion of the analysis

In this chapter, at first, it was argued that due to the explanatory characteristics of the research questions, low amount of control that the researcher could have on the course of events, and the alignment issue being a contemporary phenomenon, explorative case study methodology was chosen. After that, it was elaborated that the case selection was based on the need for a network of actors with complex interactions among them, and with both strategy and operation level related roles and responsibilities in them. Data collection was done through gathering organizational documents, interviews, and collective sessions. The issues identified in the previous section show the practical relevance of the developed approach. Proceeding through the steps of the alignment approach, introduced in section 3.4, revealed a set of issues. A summary of these issues is provided in the below table. Unlike other business model and enterprise architecture alignment frameworks discussed in section 3.5.3, that have only related the components of one side to the other side, the introduced alignment approach has created an analytical bridge between the two sides, through which these issues are identified. In addition, the approach is defined in terms of steps that guide the researcher or analyzer through the process of creating alignment between business model and enterprise architecture, and in this way reduces the complexity of the analysis process.
Table 4-1 Summary of identified issues

<table>
<thead>
<tr>
<th>#</th>
<th>Issue</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inconsistency between goals of the insurance company, and values of other actors</td>
<td>Value</td>
<td>The strategic value of the insurance company for the pension administration is being a complement for its pension products; therefore acquiring the customer base of the pension administration for insurance products is a high priority value goal for it. This value goal is missing from the value goal of the insurance company.</td>
</tr>
<tr>
<td>2</td>
<td>Hidden disagreement about the source of value of the products</td>
<td>Value</td>
<td>The corporate strategists view the value of the product in being tailored to the customer’s needs, but the priority for the insurance company’s product development is creating generic and flexible product modules.</td>
</tr>
<tr>
<td>3</td>
<td>Missing collaborations</td>
<td>Value</td>
<td>The collaboration between asset management business unit and the insurance company in managing its assets is missing from the architecture models.</td>
</tr>
<tr>
<td>4</td>
<td>Inconsistency between value goals and planning for value objects</td>
<td>Value</td>
<td>Although selling collective products to employers and sectors has higher priority than selling individual products to employees, the investments are directed to the channel for the latter.</td>
</tr>
<tr>
<td>5</td>
<td>Information redundancy</td>
<td>Information</td>
<td>Parallel activities produce redundant information.</td>
</tr>
<tr>
<td>6</td>
<td>Not realizing structures for sharing knowledge in architecture</td>
<td>Information</td>
<td>Customer understanding (sector knowledge), market knowledge, and legal knowledge are the three main bodies of knowledge that are exchanged between the insurance company and the pension administration. However, the structures for sharing the two formers are missing from the architectural models.</td>
</tr>
<tr>
<td>7</td>
<td>Inconsistency in business function decomposition</td>
<td>Process</td>
<td>The view about points of collaboration in business level, does not match the architecture.</td>
</tr>
<tr>
<td>8</td>
<td>Not well defined functions</td>
<td>Process</td>
<td>The structure for co-performing business functions is lacking from the architecture.</td>
</tr>
<tr>
<td>9</td>
<td>Lack of process integration</td>
<td>Process</td>
<td>Some of the key processes of the company are left un-automated and with human links in the conjunction points between the actors.</td>
</tr>
</tbody>
</table>

Identifying these issues provided backing for the proposed relations between business model and architecture model components. If the relations were irrelevant, it was not possible to detect inconsistencies between different levels. Also, during the process of applying the approach it was verified that the components related to each individual component can provide enough information for developing that component.

As could be observed in the extracted issues, the approach does not have a focus on either side of the relation, and is usable in both descriptive and prescriptive ways. On one hand, the business model could be translated into a description of the enterprise architecture of the firm, as could be seen in the issues related to not realizing a certain collaboration in the architecture. On the other hand, it could help in increasing the viability and feasibility of the business model, as could be observed in the issues regarding the complexities of knowledge and information exchange in the company, while in the business level it is assumed that these exchanges are being done without complexity.

By exploring the revealed issues, four patterns were identified that could impede business model viability and feasibility and decrease the value creation of the information systems in the organization. These patterns are in line with the in progress research by Solaimani et al (2013). These factors are patterns of similar issues, and together cover all of the identified issues:
1. The first factor, hidden requirements, is when the values, goals, requirements, and limitations of one stakeholder is neglected or not recognized by others. This factor is in line with requirement engineering (Meilich, 2006). Values, goals, and limitations of one stakeholder should be considered when identifying requirements for developing information systems for all other actors in the network. One example of such requirements is observed in the relation between goals of the pension administration and the information system requirements of the insurance company. A main goal of the pension administration is to use the insurance company as an auxiliary service for its services. The pension administration wants to use the insurance services, provided by the insurance company, against the negative effects of the fluctuations in second and third pillar pensions on its customers. In other worlds, it wants to support its customers with this auxiliary service in the times that the other forms of pensions are decreased based on government regulations or market conditions. This requires a wide coverage of the pension administration customers by the insurance company. Therefore, this goal of the pension administration can be translated into a customer base expansion goal for the insurance company. However, this goal is missing from the goal three of the insurance company, and hence, it is not considered when developing enterprise architecture of the insurance company. This issue is line with the debate about goal driven requirement management in information systems, as explored by Van Lamsweerde (2006) (i.e. [1] & the goal tree of the insurance company).

2. The second factor is when different stakeholders are aware of a certain issue, but there is no agreed plan for resolving those. This issue, disagreed planning, is a typical issue for multi-actor settings where there is a need for a collective action. This factor is in-line with the theory of decision-making in (see De Bruijn and Ten Heuvelhof, 2012). As an example, rapid changing customer needs and the complexity of insurance schemes are the issues that are well defined for all actors. However, for resolving them, the pension administration’s solution is making the products tailor-made to the customers’ needs, while the insurance company’s solution is creating generic product modules and gaining flexibility. Therefore the strategy level plan for the products is maximum customization, while the operational level plan is maximum flexibility in the form of generic products. The conflict happens when creating generic product modules does not allow customization of the products based on specific customer needs. The other example is the marketing strategy. While in the pension administration a high level of collaboration in this function is planned, in the operational level there are two completely divided marketing functions, one in the insurance company and on in the pension administration. Also, while the pension administration has aimed employers and sectors, in the insurance company the investments are directed into a marketing channel that is primarily useful for attracting individual employers. Therefore, the pension administration and the insurance company have two different plans for the marketing channel development, and have hidden disagreement about that. (i.e. [7] & [9]).

3. The third factor is resource scarcity, that is extracted from the theory of cooperative strategy (Dyer & Singh, 1998). This factor addresses the resources, such as assets, capabilities, or processes, which one or more actors need in order to create value, but are inaccessible and unavailable to them. The example of this factor in this case is the information and knowledge about the customer that is needed by the insurance company. This information and knowledge are partly owned by the pension administration and partly by the customers, but they remain hard to obtain due to legal and technical constraints. The legal boundary between the insurance company and the pension administration is only clear when it comes to data exchanges. When it comes to information and knowledge sharing, this border is not clarified and defined in the operational activities of the insurance company. Some operationally possible knowledge and information sharing, such as employer information or market knowledge sharing, are ignored due to their unclear legal consequences. In addition, technical requirements for sharing information or knowledge between the insurance company and the pension administration functions are not developed, and do not appear on the architecture
models. Therefore, the information and knowledge that one actor owns, and the other actor needs, is not flowed in the network to fulfill the need of the insurance company (i.e. [25]).

4. The final factor is incoherent interactions. This consists of chaotic, unorganized, unstructured, and uncoordinated activates, processes, or functions along the organization. The examples of this factor in the case were instances of information redundancy, lack of process integration, and not well-defined business functions. There are some business functions that are remained unstructured and are being performed in a chaotic way. As an example, in marketing function, redundant information is being produced by both the marketing function of the insurance company and the pension administration. Production of redundant information is the result of parallel activities. This could be performed in a more structured and efficient way (i.e. [34]).

These four factors contribute to the alignment approach by providing a lens that simplifies identifying the issues when using the framework. The user of the approach can use these four patterns as the basis of his analysis in steps 4 to 15 and try to find issues corresponding to these patterns.
5 Conclusions

5.1 A short summary of the thesis

The goal of this research was to create a link between Business Model and Enterprise Architecture for developing alignment between them and identifying and resolving the issues caused by the gap between them (see chapter 1 and section 5.2). Based on a set of criteria VISOR business model and Archimate were selected as the focus of this research, and the main question was defined as “how to align business model with enterprise architecture through relating VISOR business model and Archimate” (see section 1.2). The first phase of was reviewing four streams of literature regarding business model (section 2.1 and 2.2), enterprise architecture (section 2.3 and 2.4), and their relationship (sections 2.5 and 2.6). This was in order to provide answer to the first and second research questions regarding the components of the two modeling disciplinarians and the characteristics of their relationship. Different business modeling approaches each address a number of components (see section 2.1). The VISOR framework tries to include all components addressed by other business modeling frameworks and, at the same time, had a multi-actor focus (El Sawy & Pereira, 2013). Archimate has three layer of business, application, and infrastructure, and while the business layer is close to the business model level, the other two levels are close to the technology (Lankhorst, 2013). Therefore, it is possible to include the business layer components for the purpose of this alignment approach, and transmit the benefits or restrictions of the other layers through this layer. Regarding the relationship, literature related to contingency theory and fit, business and IT alignment, business model and business process model alignment, and business model and enterprise architecture alignment were reviewed (sections 2.5 and 2.8). It was concluded that the link between the two modeling disciplines should be an analytic and conceptual link. This means a higher level than a correspondence relationship with having the components of one model connected to the corresponding components of the other model. Also, it should include the multi-actor aspects of the relation, and have a practical value. In order to answer to the third and fourth research questions, an alignment approach was developed (section 2.7) and a case study was performed based on it (chapters 3 and 4).

5.2 Theoretical contribution

Business Modeling and Enterprise Architecture tools and frameworks are widely used in companies. As broadly discussed in chapter 2, business model aims at illustrating how firms do business and deliver value to their customers (Zott, Amit, & Massa, 2011), while enterprise architecture aims at describing and managing the changes of different information systems components and their relationship (Zachman, 1987). Both of the concepts are dynamic and complex (Bouwman et al., 2008; De Reuver et al., 2007; Janssen, 2009). In multi actor settings, such as having multiple collaborating firms, or different actors responsible for business model and enterprise architecture development, the complexity increases. A group of scholars have suggested that the alignment between them is a main success factor in implementing a sustainable business model (Bouwman et al., 2008; De Reuver, 2009; Janssen et al., 2005; Pipers & Gordijn, 2007b). Not creating the link between the two modeling formalisms may lead to different strategic or operational issues such as trying to implement a not feasible business model, or low viability of a business model, or ignoring the value creation potentials of IT (see chapter 1). There is a growing amount of literature that tries to link business models to enterprise architecture (Jacob et al., 2012; Janssen et al., 2005; Meertens & Jacob, 2012). As discussed in section 2.5.3, these frameworks share two limitations: (1) having a single-actor focus, and (2) being correspondence relationships instead of conceptual frameworks. These approaches does not address issues different aspects of the collaboration of different actors, and do not provide a ground for analysis regarding the link. Two other groups of literature analyze the gap between business and IT in general (Chan & Reich, 2007; Henderson & Venkatraman, 1993), and in a more specific scope business model and business process model alignment (Pipers & Gordijn, 2007a; Solaimani & Bouwman, 2012). While the former group have little practicality, and the scope of the latter group differs from this master thesis, both groups are used in developing the alignment approach of this thesis.
This research aims at bridging business model and enterprise architecture in a practical and analytical way. Exploring business model and enterprise architecture limitations and the way these limitations affect the organization showed that by bridging them an effective communication between IT and business people could be gained, responsibilities could be tracked, a road map for business model implementation could be created, and viability and feasibility of business models could be increased.

The alignment approach that aimed at fulfilling the goal of this thesis is formed from the three models of VISOR, VIP, and Archimate. The VIP framework was selected as the basis of the alignment approach due to being a generic and analytical framework. The relations between the components of VISOR to VIP, and VIP to Archimate, each translate a limited set of information from each layer to the other layer. When considering all relations into a certain component, all of the information that could be translated from the components of the other level to that component will be gained. These relations are defined based on the alignment literature previously reviewed and the definitions of the components provided by the authors VISOR, Archimate and VIP.

In order to reduce the complexity of using the framework and provide a walk through for the users, a set of steps where defined that taking them guides the user to a description of the current state and the issues that affect the alignment.

![Diagram of alignment approach]

**Figure 5-1** The four patterns of issues regarding the alignment of business model and enterprise architecture. The dotted lines represent the interrelationships between these factors, and the relationship between those and VISOR and Archimate.

The link between VISOR, VIP and Archimate, enables the analysis for identifying and resolving issues. These issues can affect the feasibility and viability of business model or cause the potential values of the enterprise architecture to be neglected. In order to assess and improve the practical relevance of the framework, in accordance to the fourth research question, a qualitative case study was performed in the last phase of this research. Business model and VIP model were co-developed with corresponding roles in collective sessions. The alignment approach was performed on the obtained data, and sets of issues were revealed. These issues, then, were analyzed and four patterns that concluded them were identified, being: hidden requirements, unagreed planning, resource scarcity, and incoherent interactions. For identifying the issues related to each of these factors, a set of elements should be inspected. Hidden requirements are rooted in the elements such as values and goals and happen when there is a failure in translating these into the requirements of the enterprise architecture. Unagreed planning is regarding any inconsistency in planning for known issues. The elements of resource scarcity factor are any kind of value object (including data, information and knowledge) and their flow in the network. The last factor, incoherent interactions, is about any unstructured, conflicting, or chaotic activity, and the elements that should be inspected for identifying issues from this family are activities, functions, and
processes. More explanation on these factors is provided in section 4.3. These four patterns provide a lens for the user of the framework for identifying the issues through them.

In addition to being a basis for analysis, the four identified patterns can be used as the alignment points between business model and enterprise architecture. The four factors can be used as a common language between the two modeling formalisms. Both models can deliver a list of the elements corresponding to each factor, which can serve as a departure point for discussions. The interrelationships of the elements of each factor can be developed and analyzed using VIP framework. The issues revealed through the analysis can then be tracked to their roots in VISOR or Archimate models. Figure 5-1 shows the alignment factors.

The advantage of using VIP framework together with VISOR and Archimate is that it makes analyzing the interrelationships of these components possible. In other words, using VIP expands the linking point of VISOR and Archimate and creates a new ground for analysis. The elements of each factor are corresponding to a set of VIP components, or can be detected in the way they are arranged and connected together to form VIP. Instead of connecting corresponding components, using VIP diagram another conceptual level is added between the two modeling disciplines. Those components of VISOR and Archimate that are connected through VIP are extracted from VISOR and Archimate models and inserted into the new model, so different aspects of the link between VISOR and Archimate can be analyzed. The use of the VIP diagram can also help to create a common language through which discussions can be held with both strategists and enterprise architects. Using this framework together with business and enterprise architecture models, enables the analysis of the linking points of the two models with the presence of both strategists and enterprise architects. Using this approach, the outcome of these analyses can be propagated into business and architecture models. Parts of the VIP diagram, corresponding to any of the four factors, can be checked for any potential issues, and the identified issues can be tracked into the two models and resolved by solutions that in turn can be derived by the VIP diagram and the discussions around it. Through this process, different actors can be engaged and the level of alignment could be increased.

**5.3 Practical contribution**

In a practical multi-actor setting, the alignment approach can be used for detecting the business model and enterprise architecture alignment issues and providing suggestions for resolving them. The issues that are caused by inconsistencies between business and operational levels of firms. This happens by passing through the steps of the alignment approach and performing analysis using it, as well as the guided discussions that it can create among different actors. A set of issues were identified as the result of the case study of this thesis. Four patterns of hidden requirements, unagreed planning, resource scarcity, and incoherent interactions could conclude business model and enterprise architecture alignment issues. These patterns could be used as a lens for identifying the issues when performing analysis. Also, they could be used for providing suggestions for resolving the issues.

Bellow examples are provided from the case. Based on the extracted factors and the analysis in the previous chapter, we could provide a set of suggestions for dealing with the business model and enterprise architecture alignment issues. Below, for each factor, the issues that it has caused are mentioned and suggestions for resolving them are provided. The effects of each issue are discussed in section 4.2.

As mentioned in the previous chapter, some issues related to the first factor, hidden requirements, are requirements that are ignored in enterprise architecture design. Despite of the close relation between the insurance company and the pension administration the customer base expansion goal of the latter, addressed in stakeholder network and organizational characteristics components of VISOR, is ignored from the goal three of the insurance company, as stated in Archimate model of figure 4-6. The inclusion of this goal and the requirements imposed by it, and redefining the information systems planning of the insurance company based on the revised Archimate goal three can help in resolving this issue. In addition, doing so, it will be possible to foresee these requirements and analyze the degree to
which they could be satisfied, and hence, a set of future practical problems that are currently unknown will be revealed.

Unlike the first factor issues, the solution to the issues related to unagreed planning is highly contested. In these cases, although the issue itself is agreed between different actors, each have already planned for resolving it, and the implementation of these plans may be in progress. Although the approach could help in detecting these issues and revealing them to different actors, for each of these problems there is no hard solution and the output of the analysis can serve as the input of the discussions that could lead to an agreement. In the case of the insurance company, one of the issues is the need for attracting new customers, and there are two plans for increasing the value of the products for the customers that are addressed in customer value component of VISOR. In this case, the two plans are tailor-making the products to the customer needs, and creating generic and flexible product modules that define the core technology investment component of VISOR. It is important that the two actors be aware of the disagreement and reach agreement on a level of balance between the two specificity and generic ends. The other issue related to unagreed planning, is the planning for the marketing channels, where the primary target customers are the employers and sectors, but the investments are being directed to the customer portal that is more practical in attracting employees. The marketing channels are modeled using the channel component of VISOR. Based on the VIP analysis, one solution to this issue is to modify the customer’s portal, in a way that it serves as an automated link between the sector managers, sectors, employers, and the marketing function of the insurance company. This new setting can replace the existing VIP arrangement that is manual links between sector managers of the pension administration and marketing function of the insurance company. In this way, the existing ad-hoc sector marketing functions will be structured, and the manual link between sector managers of the pension administration, and the marketing function of the insurance company will be automated.

The main issue related to the third factor, resource scarcity is the need of the insurance company for information and knowledge about its customer that can be seen in the value network component of VISOR, displayed in figure 4-2. The issue rises due to the fact that the insurance company has to maintain independence from the pension administration by law. However, the exact instances that the regulations apply to are vaguely defined and considered in the architecture. While law requires the separation of databases, there is no regulation about knowledge transfer between the two companies. The exact instances of the VIP information level components, such as marketing knowledge and sector knowledge, that the pension administration owns and the insurance company needs should be identified, their legal matters should be analyzed, and structures for co-developing or sharing those could be implanted in the enterprise architecture of the insurance company. In this way, knowledge transfer will happen in a more effective way, and the business strategists’ assumptions about these transfers will become more accurate. This can be possible by redefining the information level components of VIP in more details and creating links for performing the legal sharing of knowledge between the pension administration and those business functions of the insurance company that need those. Archimate’s actors collaboration model, business function model, business process model, and data object model of the insurance company (the two last ones are not yet designed) can then be adjusted based on these changes.

Finally, there are the issues regarding the incoherent interactions factor. These issues are related to the links between the insurance company and the pension administration. These points of interactions are remained unstructured and there is no specific future plan for them. The interactions between the two companies happen through sharing software components in parts of specific functions, as shown in Archimate business function and application components view of figure 4-8, and ad-hoc, through personal contacts, as can be seen VIP diagram of figure 4-4. Revising the business function decomposition in both business model and operational levels and removing the inconsistencies could be the first step in resolving this issue. The marketing, asset management, and risk management functions are the three functions that should be revisited. After reaching a consistent business function decomposition, it will be possible to redefine the business processes linking the two companies in order to restructuring the collaborations. The effect of this change in the VIP diagram will be vaguely
defined interaction points, to well defined business processes with clear input and output that each actor is responsible for and will receive. Automating some critical collaboration points, such as that by the sector managers, could be a future step.

However, we are aware that this analysis is a preliminary analysis and it is possible to further extract it by removing the limitations of this research or following the research suggestions as addressed in the next sections.

5.4 Research Limitations

Being a master thesis, this research was supposed to be done in a limited time span. The time limitation affected the direction of some of the critical choices during this master thesis. Without this limitation, it was possible to perform a structured literature study about business model, enterprise architecture, and the link between business model and enterprise architecture. Also, instead of a multiple case study, a single case study was performed. That was because a five month time period was not enough for such an activity. However, with a multiple case study it was possible to provide more rigor and compelling results by applying comparative studies, sampling logic, and replication logic. In addition, with more time, it was possible to provide more theoretical support for the alignment approach and the four identified patterns, by relating the patterns to the corresponding theories in a structured way.

Another set of limitations was related to the case under study. Although the firm was a network of different collaborating actors, there was no value conflict or competition between the actors inside the network. In a network consisting of competing firms with conflicting values, there will be a chance of identifying conflicting value exchanges, information exchanges and business processes, due to the fact that the final goal of the firms is maximizing their own captured value. In addition, the case was a for-profit firm from the insurance industry. The result could be different in other industries, and in non-profit settings. Also, the insurance industry is not a technology intensive industry, and hence, this research had limited ability to find technology related issues. In addition, the insurance company was only focused on specific parts of business model and enterprise architecture models. For example, they had not developed their architectural models any lower than the business layer. There were only a few models with some application layer components in them. The insurance company was in the process of developing its data object model and its process model, that both are important parts of enterprise architecture. To fill this gap, through the interviews it was tried to receive information about these models. However, analyzing a case with a comprehensive enterprise architecture model may reveal new insights to the researcher.

The choice of VISOR, Archimate, and VIP has also imposed some limitations on this research. Instead of building the alignment approach on VIP framework, it was possible to approach the issue through business/IT alignment line of research. Another possibility was to use other, or a combination of different, alignment frameworks. VIP contains a broad set of components and helped this research to maintain its focus on different aspects of alignment. However, using other frameworks instead of VIP could direct the focus to a certain set of components, such as value layer or information layer components, and this could lead to revealing more issues in these domains. Choosing VISOR business model and Archimate is limited its applicability to different cases. An alternative was to develop a generic alignment approach that could be used in combination of different business modeling and enterprise architecture frameworks. Also, using other frameworks could make the alignment approach more suitable for specific domains. As an example, using STOF framework instead of VISOR could make the results of this research more applicable to mobile services.

5.5 Future areas of research

The present master thesis was limited to VISOR business model and Archimate. However, there are many business model and enterprise architecture frameworks that are being used in different enterprises. The presented alignment approach can be used in combination with those models, by translating those to VISOR and Archimate prior to applying the approach. However, a generic and
framework-independent approach will have more practicality in different enterprises using these models due to easier use.

In addition, other research methods can be used to evaluate the alignment between BM and EA. The alignment approach and the relations between business model and enterprise architecture components could also be developed using quantitative research. Relating business model components to enterprise architecture components using quantitative research could be an interesting research topic.

Performing this research in other industries or other types of networks could expand the patterns, identified in the last phase of this research. Two specific alternatives are technology intensive industries (i.e. mobile services), and the platforms with competing participants. The set of patterns can then be tested and validated by quantitative research.

Another interesting research topic is to analyze the way the politics of decision making in networked enterprises affects the relation between business model and enterprise architecture. In a networked setting, there are many groups of business strategists and enterprise architects with different values and interests that are responsible for developing business and architecture models. Viewing and analyzing all these sub-processes as a whole could provide new means for developing alignment between enterprise architecture and business model. A link between two components one in business model and one in architecture model is, in fact, a link between two groups of decision makers responsible for these two components. The way these interactions could be guided and controlled with the goal of developing alignment could be an interesting research area.

Finally, developing the VIP model in order to create the bridge between business model and enterprise architecture is a time consuming and chaotic activity. IT requires interactions with different roles inside and outside the organization. Developing a generic method or tool for developing the VIP model could be helpful in simplifying and structuring this activity.
6 Appendices

6.1 Appendix 1: References


6.2 Appendix 2: Summary of business model and enterprise architecture limitations

Table 6-1 Business model limitations

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<tr>
<th>#</th>
<th>Issue</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Not addressing implementation and operationalization of the business model, and not foreseeing the implications of the concrete choices made in the business model on the firm’s information systems</td>
<td>(Osterwalder et al., 2005), (Hedman &amp; Kalling, 2003)</td>
</tr>
<tr>
<td>2.</td>
<td>Not providing a mechanism for ensuring effective usage of the resources and creating cohesion and synergy among different activities</td>
<td>(Hedman &amp; Kalling, 2003)</td>
</tr>
<tr>
<td>3.</td>
<td>Misunderstandings about value creation and value capture</td>
<td>(Shafer et al., 2005)</td>
</tr>
<tr>
<td>4.</td>
<td>Considering inaccurate anticipations, and illogical or not well-founded cause and effect relationships in business model design</td>
<td>(Shafer et al., 2005)</td>
</tr>
<tr>
<td>5.</td>
<td>Not considering all aspects of the core logic of the firm in the business model, and focusing on a few components</td>
<td>(Shafer et al., 2005)</td>
</tr>
<tr>
<td>6.</td>
<td>Having flawed assumptions about the firm’s value network</td>
<td>(Shafer et al., 2005)</td>
</tr>
<tr>
<td>7.</td>
<td>A variety of different business models, each having a certain focus and being unable to provide an overall analysis of the firm and its value network</td>
<td>(Morris et al., 2005)</td>
</tr>
</tbody>
</table>

Table 6-2 Enterprise architecture limitations

<table>
<thead>
<tr>
<th>#</th>
<th>Limitation</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Variety of enterprise architecture frameworks and lack of unified terminology</td>
<td>(Jonkers et al., 2006)</td>
</tr>
<tr>
<td>2.</td>
<td>Limited ability in modeling networked enterprises</td>
<td>(Camarinha-Matos &amp; Afsharmosh, 2007), (Kaisler, Armour, &amp; Valivullah, 2005)</td>
</tr>
<tr>
<td>3.</td>
<td>Being IT-centric and deficiencies as a means of communication</td>
<td>(Lankhorst, 2013)</td>
</tr>
<tr>
<td>4.</td>
<td>Does not reflect the dynamics of the system that it represents (Meilich, 2006)</td>
<td>(Meilich, 2006)</td>
</tr>
</tbody>
</table>

6.3 Appendix 3: Limitations of existing business model to enterprise architecture alignment frameworks

Table 6-3 Characteristics and limitations of existing business model and enterprise architecture frameworks

<table>
<thead>
<tr>
<th>Characteristic of the alignment framework</th>
<th>Potential limitation/drawback</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inability in addressing all aspects of networked enterprises</td>
<td>Not foreseeing the inter-organizational integration requirements in business model design. The alignment methods do not mention the politics around the cost and responsibility allocation to the activities.</td>
<td>E3-value model, used by Janssen (2005), does not accept information exchange as value exchange. CANVAS model used by Iacob et al. (2012) has a single firm focus. Janssen’s (2005) framework does not allow multiple actors, since the business and application layers are only connected through one single link which is between business process and application component.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Being a correspondence relationship instead of providing a conceptual alignment (Mapping or linking two frameworks Vs. developing a conceptual framework for the alignment of the two frameworks)</td>
<td>Although describing the alignment, not giving the architect any tool to reach the alignment. Variations in mapping/conversion in practice (Jonkers et al., 2012) makes a one to one mapping not practical. Many firms may not use a specific enterprise architecture framework for all parts of the organization. Due to the lack of conceptualization, if certain components in either EA or BM sides are lacking the framework will not be usable. Because of being detailed and tool dependent, they add complexity and reduce agility; therefore their added value to the firm is contested. Due to the vast variety of situations in reality, a very detailed approach, in general, will be less practical than a generic approach.</td>
<td>The business model concept of resources may be mapped to EA component of human, data or object resources, depending on its type. However, in Fritscher and Pigneur (2011) and it is only mapped to “resource”. Some companies use “IT architecture” instead of “enterprise architecture”. Since IT architecture is disconnected from strategy, (Ross et al., 2006) there is no immediate equivalent for the business layer of Archimate in the IT architecture frameworks.</td>
</tr>
</tbody>
</table>
### 6.4 Appendix 4: Archimate concepts

#### Table 6-4 Application layer concepts

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application component</td>
<td>A modular, deployable, and replaceable part of a software system that encapsulates its behavior and data and exposes these through a set of interfaces.</td>
<td><img src="image" alt="Application component" /></td>
</tr>
<tr>
<td>Application collaboration</td>
<td>An aggregate of two or more application components that work together to perform collective behavior.</td>
<td><img src="image" alt="Application collaboration" /></td>
</tr>
<tr>
<td>Application interface</td>
<td>A point of access where an application service is made available to a user or another application component.</td>
<td><img src="image" alt="Application interface" /></td>
</tr>
<tr>
<td>Data object</td>
<td>A passive element suitable for automated processing.</td>
<td><img src="image" alt="Data object" /></td>
</tr>
<tr>
<td>Application function</td>
<td>A behavior element that groups automated behavior that can be performed by an application component.</td>
<td><img src="image" alt="Application function" /></td>
</tr>
<tr>
<td>Application interaction</td>
<td>A behavior element that describes the behavior of an application collaboration.</td>
<td><img src="image" alt="Application interaction" /></td>
</tr>
<tr>
<td>Application service</td>
<td>A service that exposes automated behavior.</td>
<td><img src="image" alt="Application service" /></td>
</tr>
</tbody>
</table>

#### Table 6-5 Business Layer Concepts

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business actor</td>
<td>An organizational entity that is capable of performing behavior.</td>
<td><img src="image" alt="Business actor" /></td>
</tr>
<tr>
<td>Business role</td>
<td>The responsibility for performing specific behavior, to which an actor can be assigned.</td>
<td><img src="image" alt="Business role" /></td>
</tr>
<tr>
<td>Business collaboration</td>
<td>An aggregate of two or more business roles that work together to perform collective behavior.</td>
<td><img src="image" alt="Business collaboration" /></td>
</tr>
<tr>
<td>Business interface</td>
<td>A point of access where a business service is made available to the environment.</td>
<td><img src="image" alt="Business interface" /></td>
</tr>
<tr>
<td>Location</td>
<td>A conceptual point or extent in space.</td>
<td><img src="image" alt="Location" /></td>
</tr>
<tr>
<td>Business object</td>
<td>A passive element that has relevance from a business perspective.</td>
<td><img src="image" alt="Business object" /></td>
</tr>
<tr>
<td>Business process</td>
<td>A behavior element that groups behavior based on an ordering of activities. It is intended to produce a defined set of products or business services.</td>
<td><img src="image" alt="Business process" /></td>
</tr>
<tr>
<td>Business function</td>
<td>A behavior element that groups behavior based on a chosen set of criteria (typically required business resources and/or competences).</td>
<td><img src="image" alt="Business function" /></td>
</tr>
<tr>
<td>Business interaction</td>
<td>A behavior element that describes the behavior of a business collaboration.</td>
<td><img src="image" alt="Business interaction" /></td>
</tr>
<tr>
<td>Business event</td>
<td>Something that happens (internally or externally) and influences behavior.</td>
<td><img src="image" alt="Business event" /></td>
</tr>
<tr>
<td>Concept</td>
<td>Description</td>
<td>Notation</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Business service</td>
<td>A service that fulfills a business need for a customer (internal or external to the organization).</td>
<td>![Business service]</td>
</tr>
<tr>
<td>Representation</td>
<td>A perceptible form of the information carried by a business object.</td>
<td>![Representation]</td>
</tr>
<tr>
<td>Meaning</td>
<td>The knowledge or expertise present in a business object or its representation, given a particular context.</td>
<td>![Meaning]</td>
</tr>
<tr>
<td>Value</td>
<td>The relative worth, utility, or importance of a business service or product.</td>
<td>![Value]</td>
</tr>
<tr>
<td>Product</td>
<td>A coherent collection of services, accompanied by a contract/set of agreements, which is offered as a whole to (internal or external) customers.</td>
<td>![Product]</td>
</tr>
<tr>
<td>Contract</td>
<td>A formal or informal specification of agreement that specifies the rights and obligations associated with a product.</td>
<td>![Contract]</td>
</tr>
</tbody>
</table>

Table 6-6 Motivational concepts

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholder</td>
<td>The role of an individual, team, or organization (or classes thereof) that represents their interests in, or concerns relative to, the outcome of the architecture.</td>
<td>![Stakeholder]</td>
</tr>
<tr>
<td>Driver</td>
<td>Something that creates, motivates, and fuels the change in an organization.</td>
<td>![Driver]</td>
</tr>
<tr>
<td>Assessment</td>
<td>The outcome of some analysis of some driver.</td>
<td>![Assessment]</td>
</tr>
<tr>
<td>Goal</td>
<td>An end state that a stakeholder intends to achieve.</td>
<td>![Goal]</td>
</tr>
<tr>
<td>Requirement</td>
<td>A statement of need that must be realized by a system.</td>
<td>![Requirement]</td>
</tr>
<tr>
<td>Constraint</td>
<td>A restriction on the way in which a system is realized.</td>
<td>![Constraint]</td>
</tr>
<tr>
<td>Principle</td>
<td>A normative property of all systems in a given context, or the way in which they are realized.</td>
<td>![Principle]</td>
</tr>
</tbody>
</table>

6.5 Appendix 5: Interview questions

Table 6-7 Interview questions for different roles.

<table>
<thead>
<tr>
<th>#</th>
<th>Purpose</th>
<th>Question</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Background</td>
<td>What is the background of the interviewee and recent tasks or projects that he/she has worked on in the company?</td>
<td>Introductory question, conversation opener, identifying the frame of reference.</td>
</tr>
</tbody>
</table>
2. **Business model**
   - With which partners do your company collaborate, what resources (tangible and intangible) and capabilities does it share, and what activities does it co-perform with them, in order to deliver the service, and how does the company do it?
   - The sub-components of the organizing model component of VISOR (value network, stakeholder network, key partnerships, channel, connected activities, and organizational characteristics). Key resources and logistical stream sub-components of the service platform component. Also financial flows of the revenue/cost component, and service and linkages, and value interfaces sub-components form the interface component.

3. **Business model**
   - What are the target customers of the service, what do they value, what is the delivery channel to them, how do you charge them, and how do you share the revenue with the partners?
   - The value component (including customer, customer value, customer relationship, customer behavior) of VISOR. Parts (revenue stream, financial flows) of the revenue/cost component. And the customer interface sub-component of the interface component.

4. **Business model**
   - What are the main cost elements of the service delivery, what are the core technological investments, and on what IT infrastructure (hardware/software) do you offer it?
   - The remaining components of service platform (technology, core technology investments, and IT infrastructure). The remaining sub-components (financial aspects financial model) of the revenue/cost component.

5. **Business model**
   - What interface does your customer use to access the service? Does it have any linkage with any other service/interface?
   - The interface component of VISOR business model.

6. **Alignment**
   - Which part of the business model do you find most critical and why? (In Value, Interface, service platform, organization, and revenue/cost structures)
   - In order to identify critical and potentially problematic components.

7. **Alignment**
   - How do you assess the potentials and threats of the current business model?
   - In order to identify critical and potentially problematic components.

8. **Alignment**
   - What values and values activities (creation, exchange, capturing) are the most critical, vulnerable, complex, or problematic? And how to deal with them?
   - In order to identify critical and potentially problematic interactions.

9. **Alignment**
   - What information resources and information activities (creation, exchange) are the most critical, vulnerable, complex, or problematic? And how to deal with them?
   - In order to identify critical and potentially problematic interactions.

10. **Alignment**
    - What primary business processes are the most critical, vulnerable, complex, or problematic? And how to deal with them?
    - In order to identify critical and potentially problematic interactions.

11. **Enterprise Architecture**
    - What information (resources) is (should be) exchanged between stakeholders? (In terms of information (also data and knowledge objects needed for the value activities)
    - Each role can provide information about parts of the value activities and information flow between the actors in the networked organization. Business strategists are expected to provide information about value activities and the other roles about data/information/knowledge creation and exchange.
    - How are the data/information/knowledge created and exchanged between stakeholders? (In terms of information flow, information authorization, information dependencies)
What are the primary business processes shared between or interconnecting the stakeholders? (Referring to processes that are supporting the value and information activities)
How are these business processes flow between stakeholders? (In terms of process behavior, process boundaries, and process dependencies)

What are the main services that each architectural layer delivers to the upper level?

What are the main components of application and technology layers of the enterprise model?

The information retrieved by this question, in combination with the information from other sources (i.e. organizational documents) helps in drawing the relations between architectural layers.

The information retrieved by this question, in combination with the information from other sources (i.e. organizational documents) helps in drawing the architectural plan of the company.

### 6.6 Appendix 6: Coding

Table 6-8 Detailed codings

<table>
<thead>
<tr>
<th>Master Code</th>
<th>Sub-Code</th>
<th>Sub-Code</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>V: Value</td>
<td>CUS: Customer</td>
<td>BM-V-CUS</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>CV: Customer value</td>
<td>BM-V-CV</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>CUN: Customer understanding</td>
<td>BM-V-CUN</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>CR: Customer relationship</td>
<td>BM-V-CR</td>
</tr>
<tr>
<td>5.</td>
<td>I: Interface</td>
<td>S&amp;L: Services and linkages</td>
<td>BM-I-S&amp;L</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td>VI: Value interface</td>
<td>BM-I-VI</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>CI: Customer interfaces</td>
<td>BM-I-CI</td>
</tr>
<tr>
<td>8.</td>
<td>S: Service</td>
<td>TCH: Technology</td>
<td>BM-S-TCH</td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td>CTI: Core technological investments</td>
<td>BM-S-CTI</td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td>KR: Key resources</td>
<td>BM-S-KR</td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td>ITI: IT Infrastructure</td>
<td>BM-S-ITI</td>
</tr>
<tr>
<td>12.</td>
<td></td>
<td>LGS: Logistical stream</td>
<td>BM-S-LGS</td>
</tr>
<tr>
<td>13.</td>
<td>O: Organization</td>
<td>CH: Channels</td>
<td>BM-O-CH</td>
</tr>
<tr>
<td>14.</td>
<td></td>
<td>VN: Value network</td>
<td>BM-O-VN</td>
</tr>
<tr>
<td>15.</td>
<td></td>
<td>OC: Organizational characteristics</td>
<td>BM-O-OC</td>
</tr>
<tr>
<td>16.</td>
<td></td>
<td>KP: Key partnerships</td>
<td>BM-O-KP</td>
</tr>
<tr>
<td>17.</td>
<td></td>
<td>SN: Stakeholder network</td>
<td>BM-O-SN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>CA: Connected activities</td>
<td>BM-O-CA</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>R: Revenue/Cost</td>
<td>BM-R-FA</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>FF: Financial flows</td>
<td>BM-R-FF</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>FM: Financial model</td>
<td>BM-R-FM</td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>RS: Revenue stream</td>
<td>BM-R-RS</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>V: Value</td>
<td>VIP-V-S</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>S: Stakeholder</td>
<td>VIP-V-S</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>R&amp;P: Resources (value objects) &amp; propositions (value goals)</td>
<td>VIP-V-R&amp;P</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>VA: Value activities</td>
<td>VIP-V-VA</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>VD: Value dependencies</td>
<td>VIP-V-VD</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>I: Information</td>
<td>VIP-I-IA</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>IA: Information access</td>
<td>VIP-I-IA</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>DIK: Data, information, or knowledge objects</td>
<td>VIP-I-DIK</td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>IF: Information flow</td>
<td>VIP-I-IF</td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>ID: Information dependencies</td>
<td>VIP-I-ID</td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>P: Process</td>
<td>VIP-P-BPD</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>BPD: Process dependencies</td>
<td>VIP-P-BPD</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>AS: Active structures</td>
<td>EA-AS-BA</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>BI: Business interface</td>
<td>EA-AS-BI</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>BR: Business role</td>
<td>EA-AS-BR</td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>BC: Business collaboration</td>
<td>EA-AS-BC</td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>PS: Passive structures</td>
<td>EA-PS-V</td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>M&amp;G: Motivation and goal (Or stakeholder value)</td>
<td>EA-PS-M&amp;G</td>
<td></td>
</tr>
<tr>
<td>41.</td>
<td>P: Value object (Product)</td>
<td>EA-PS-P</td>
<td></td>
</tr>
<tr>
<td>42.</td>
<td>M: Meaning</td>
<td>EA-PS-M</td>
<td></td>
</tr>
<tr>
<td>43.</td>
<td>C: Contract</td>
<td>EA-PS-C</td>
<td></td>
</tr>
<tr>
<td>44.</td>
<td>R: Representation</td>
<td>EA-PS-R</td>
<td></td>
</tr>
<tr>
<td>45.</td>
<td>D: Data</td>
<td>EA-PS-D</td>
<td></td>
</tr>
<tr>
<td>46.</td>
<td>BO: Business object</td>
<td>EA-PS-BO</td>
<td></td>
</tr>
<tr>
<td>47.</td>
<td>B: Behaviors</td>
<td>EA-B-BS</td>
<td></td>
</tr>
<tr>
<td>48.</td>
<td>PFI: Business process, function, interaction</td>
<td>EA-B-PFI</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>49.</td>
<td>E: Business event</td>
<td>EA-B-E</td>
<td></td>
</tr>
</tbody>
</table>