MASTER'S THESIS

The relationship between Agile and coevolutionary IS-alignment in a complex organization

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Abstract

Contemporary organizations find themselves in a complex and turbulent environment. This is due to the fact that changes occur at a frequent and rapid pace as a result of globalization and digitalization. To stay afloat and face the competition, organizations invest in IT. However, it seems difficult for companies to achieve a good alignment between business and IT. To address the lack of business-IT alignment (BITA) in complex, turbulent environments co-evolutionary IS-alignment (COISA) has arisen in literature. COISA are the series of co-evolutionary moves that makes IS aligned over time. There is a two-way evolution of both business and IT domains. In this thesis, a reply is given to the call for more empirical evidence to investigate COISA in complex and turbulent organizations with many different stakeholders. Therefore, a single case study has been performed to investigate COISA in an Agile software development organization in which many stakeholders are involved. Both Agile and COISA attempt to achieve a better BITA through continuous interactions between different stakeholders in complex organizations. A single case study allows us to get an in-depth understanding of the complex social phenomena that emerges during the manifestation of COISA in an Agile organization.

Key terms

Co-evolutionary IS-alignment (COISA), complexity, Agile, software development.

Summary

Globalization and digitalisation are causing more rapid and frequent changes. As a result, environments in which organizations operate and compete become more complex and turbulent. An approach for companies to keep up with the competition is to invest in information technology (IT). Unfortunately, these investments often fail. The reason for this is the lack of proper coordination between business and IT. In response to this in literature co-evolutionary IS-alignment (COISA) was created.

COISA are a series of co-evolutionary moves that makes IS aligned over time. There is a two-way evolution of both business and IT domains. The COISA model can be applied from a holistic perspective, looking at processes at both a strategic and as well as at an operational level. These processes are strategy formulation and strategy implementation on a strategic level. IT implementation and IT usage at the operational level and enterprise architecture management is the process between the operational and strategic level. The model originated from the complexity that companies face today. By means of the model it can be investigated whether within and/or between the processes interactions take place between different stakeholders.

A working manner to achieve a better business-IT alignment (BITA) is Agile. Working Agile makes it possible to respond more quickly to the increasing extent and speed of changes that are occurring nowadays. Agile can be defined as a short cyclic manner of working in which all required roles are involved to develop, for example, software and is used to quickly adapt to a rapidly changing environment.

Agile and COISA show a number of similarities. Both theories attempt to achieve a better BITA through continuous communication between the different stakeholders. In addition, in both theories the complexity of the environments plays a major role. Because of these similarities, it is interesting to investigate how COISA manifests itself in an Agile environment. Therefore, the following research question is formulated: "*What is the difference between how COISA manifests itself in an organization that does not work Agile and in an organization that works Agile?*".

A theoretical framework has been set up in which scientific literature has examined what has already been written about the most important concepts and theories from this thesis. The most important concepts in this research are COISA, Agile software development and the different stakeholders involved in an Agile environment and COISA.

To answer the research question a single case study has been performed. The advantage of a case study is that it leads to a lot of detailed information which has been collected through semi-structured interviews. The research was conducted at a financial services provider within the asset management business unit. At the department a transition to Agile took place. Through retrospective interviews, research was conducted into how COISA manifested itself before working Agile and now that Agile is being worked during the implementation and further development and maintenance of the accounting system.

The results show, in case Agile is not used, COISA manifests itself in all alignment processes. There is also co-evolution between these processes. In the strategic context, however, this is a one-way interaction. Stakeholders are mainly located at a higher hierarchical level in the organization. In the operational context there is two-way interaction. Stakeholders are not only involved at a higher

hierarchical level in the organization, but also stakeholders at a lower level in the organization. However, the decisions are made by the stakeholders who are at a higher hierarchical level in the organization.

In the case of Agile, COISA has only been identified in the processes IT implementation and IT usage. An explanation for this is the phase of the system in which it finds itself at the moment of working Agile, namely the management and further development phase. Interviewees indicated that strategy is no longer a subject for discussion and is no longer being coordinated. In comparison to the existing literature, the finding that COISA manifests itself in the alignment process IT usage in an Agile context is an addition to the founded literature. Similarly, as in the case of non-Agile, co-evolution takes place between the processes in the operational context. The difference, however, is that co-evolution takes place much more in the case of Agile working. Communication takes place directly. No COISA is found in the enterprise architecture management process. The results show that the organization is seeking how to deal with architecture in an Agile context. This is in line with the existing literature in which it can also be seen that organizations are seeking this.

Limitations of the study are in particular in the time in which the study has been carried out. The system was fully implemented in January 2019, after which management and further development of the system started. In March 2019, the department responsible for the system started working Agile.

Contents

1. Introduction

As a consequence of digitalization and globalization, the world becomes a more and more turbulent environment. Organizations become more complex and changes occur more frequently. This means that organizations have to anticipate these changes faster than before (Walraven, van de Wetering, Helms, Versendaal, & Caniëls, 2018). A strong way for organizations to anticipate these changes and to achieve competitive advantage is to invest in information technology (IT) (Gerow, Grover, Thatcher, & Roth, 2014). These investments may lead, inter alia, to more efficient processes, reduction of costs, better deals with business partners, better creativity and ideation processes, and improved reputation (Devaraj & Kohli, 2003; Kearns & Lederer, 2003; Müller & Ulrich, 2013). In practice, however, IT investments seldom result in organizational performance. This may be due to a lack of alignment between business and IT (Brynjolfsson & Hitt, 2000). Until today a major challenge in organizations is the business IT alignment (BITA). BITA means to apply IT in an appropriate and timely way, in harmony with business strategies, goals and needs (Luftman & Kempaiah, 2007).

A work approach, to invest in IT, can be Agile (Highsmith & Cockburn, 2001; Kettunen, 2008). According to Kettunen (2008), Agile offers the ability to quickly adapt to changing requirements. Agile is a methodology in which providing rapid customer satisfaction and continuous deliveries are the most important principles (Balaji & Murugaiyan, 2012). Christopher (2000) also acknowledges today's turbulent and volatile markets and as a consequence life cycles shorten, global economic and competitive forces creates additional uncertainties. Lengthy and slow-moving working practices manners involve a high risk because organizations therefore cannot anticipate quickly to these turbulent and volatile environments. Christopher (2000) describes that the key to survive these environments is agility.

From an IT perspective, Agile can be used to develop software. In the Agile manner Balaji and Murugaiyan (2012) describe that developing software is achieved by an adaptive team, represented by all required roles to develop the software, which is able to respond quickly to changing requirements and frequently delivers working software. There is continuous face to face communication between the development team and their clients (Balaji & Murugaiyan, 2012). Small working software is delivered in time periods of weeks and not in months or years which is the case in the so-called waterfall method. Balaji and Murugaiyan (2012) describes that within the waterfall method there is a sequence of stages (analysis, design, development, testing, implementation and maintenance) in which the output of each stage becomes the input for the next stage. In contrast to the Agile methodology, not all required roles are involved at all times.

In the beginning of this chapter the contemporary phenomenon, of the rapidly changing and growing world, is outlined. As discussed, a way for organizations to respond to the phenomena is to invest in IT (Gerow et al., 2014). Because BITA is a major topic many studies have been conducted. For example, Chan and Reich (2007) have described two perspectives on alignment. Firstly, the perspective of alignment as a process. Secondly, alignment as a goal or end state. Despite these thorough studies, existing information systems (IS) theories including addressing BITA do not take into account today's complexity and environmental turbulence organizations are in (Merali & McKelvey, 2006; Merali, Papadopoulos, & Nadkarni, 2012). Because of this absence in literature, scholars have adopted complexity theory and related complex adaptive systems (CAS) principles

(Merali et al., 2012). The reason for this adoption is to figure out a way to better address challenges in organizations surrounded by a complex and turbulent environment. For example, addressing challenges related to BITA (Merali et al., 2012; Onik, Fielt, & Gable, 2017). By adopting complexity- and CAS principles, co-evolutionary IS/IT alignment (COISA) emerged (Amarilli, Van Vliet, & Van den Hooff, 2017; Benbya & McKelvey, 2006). Benbya and McKelvey (2006) define COISA as the series of co-evolutionary moves that makes IS aligned over time. There is a two-way evolution of both business and IT domains. Until now, the concept of COISA remains vague. Mostly because of the fact that the unique business processes within COISA are left implicit by most scholars and not many scholars have taken a holistic view on all processes involving COISA (Amarilli et al., 2017; Benbya & McKelvey, 2006). This holistic view is necessary to address the internal and external complexity organizations are in and which can help to achieve a better alignment (Walraven et al., 2018).

To find empirical evidence for an explicit connection between business processes in practice and the notion of alignment as a process Walraven et al. (2018) have done research into which business processes co-evolutionary alignment takes place. Based on the results of this research Walraven et al. (2018) developed a new model consisting of five processes within complex organizations. These are processes on a strategic level (strategy formulation and strategy implementation), an operational level (IT usage and IT implementation) and in between (enterprise architecture management). The model focusses on interactions and collaboration between business actors, IT actors and external actors. These actors are the stakeholders. The goal of this model is to accomplish a better alignment between the strategic and operational level through continuously having interactions and collaboration between and within processes. Interactions should always take place, in order to respond to the fast and quick changes occurring every day (Walraven et al., 2018). Walraven, Van de Wetering, Versendaal, and Caniëls (2019) have developed the model in a holistic way.

In order to substantiate the model by empirical evidence Walraven et al. (2018) have been conducted research into how COISA manifests within the implementation of Electronical Medical Records (EMR) at three hospitals in the Netherlands by a multiple case study. According to Walraven et al. (2019) the implementation of EMR is a complex process because it requires many different stakeholders to communicate and collaborate effectively with each other, in order to successfully implement the EMR. The research of Walraven et al. (2019) has shown that COISA manifests itself in all three hospitals in different manners and at different levels. In addition, the research of Walraven et al. (2019) has shown that interactions and collaborations take place within and between the processes between many different stakeholders.

As said, empirical research using COISA has been done in three hospitals. This implies that little research has been conducted using COISA in practice. There is more empirical evidence needed to substantiate the theory by Walraven et al. (2018) for scientific relevance. Besides this, practical relevance of this research will contribute to the understanding of alignment in a complex organization.

Literature does not provide links between developing software with an Agile approach and every co-evolutionary business process. It is very interesting to undertake more research on this. Hence, a holistic view of all co-evolutionary business processes can be given by using Walraven et al. (2018)

model so the internal and external organizational complexity can be addressed (Walraven et al., 2018). In addition, research can point out if the Agile working approach has an impact on the interactions between and within the co-evolutionary alignment processes.

As a result, the following research question has arisen: "*What is the difference between how COISA manifests itself in an organization that does not work Agile and in an organization that works Agile?*".

The research will be done by a single case study. A case study will be conducted because this method generates insights from intensive and in-depth research into the study of a phenomenon in a real-life context (Saunders, Lewis, & Thornhill, 2016).

In the remainder of this paper the theoretical framework will be discussed in the next chapter. Then, the methodology will be explained. Lastly, the findings and conclusions will be presented.

2. Theoretical framework

This chapter will describe how the research has been approached. Followed by a description of the most important results of the scientific articles and finally the most important terms will be explained.

2.1 Research approach

In order to answer the research question, relevant scientific articles were searched for. This was carried out by using specific search terms and specific search methods in specific search machines.

Initially, two articles were used, namely "Co-evolutionary IS-alignment: A Complex Adaptive Systems Perspective" (Walraven et al., 2018) and "Using a co-evolutionary IS-alignment approach to understand EMR implementations" (Walraven et al., 2019). These articles gave a clear description of the term COISA and how COISA arises. Later in this chapter, an explanation of the term COISA will be given in a more detailed way. In addition to these articles, further relevant articles were searched with the search terms 'COISA', 'BITA', 'Business IT alignment', 'Agile strategy', 'Agile Enterprise Architecture Management', 'Agile and COISA', IT implementation Agile' and 'Agile software development'. The terms are based on the read articles and with these new terms a query has been carried out on Google Scholar. In addition to Google Scholar, a query was carried out in the Open University (OU) Library because this library is more transparent than Google Scholar. The technique used for the search terms is the so-called building block method. The building block method is characterized by using terms of the research question in the search bar of the search engine and replace terms with synonyms or combine terms (Okoli & Schabram, 2010). Because the library of the OU is very structured this is a very suitable search technique. Additionally, this technique has been used in the database of the Association for Information Systems (AIS) because this database offers an advanced search function. This database has been used for information about information systems and Agile software development. An overview of the search method can be found in appendix A. Another technique that has been used is the backward snowball technique. This technique looks at the citations in an article itself (Groningen, 2019). Other related articles have been found using this technique. By using this technique, insight has been gained into what specific subjects or terms underlie it. It was very useful to read these articles because it gave more background information and the terms, events and choices could be placed in perspective.

2.2 Results

The outcome of this search technique resulted in about 100 articles. These articles were assessed on a number of criteria to determine whether the articles were useful for the research. Firstly, only articles that were valuable were selected. This implies peer-reviewed articles that contained as little subjectivity as possible, but were based on systematic research (Saunders et al., 2016). Secondly, it was assessed whether the articles were relevant to the research. This implies that articles have been selected which clearly showed in the abstract what the article is concerned with, for example, COISA, BITA or Agile software development (Saunders et al., 2016). After assessing the abstract, the introduction, theoretical framework and conclusion/discussion were also assessed for relevance. Following the application of these criteria, 17 articles were found to be suitable for the research. An overview of these suitable articles can be found in appendix B.

2.3 Definitions and terminology

The most important terms will now be explained. Firstly, it is important to clarify the definition of COISA in this study.

2.3.1 COISA

As previously mentioned, COISA is the series of co-evolutionary moves that makes IS aligned over time (Benbya & McKelvey, 2006). The concept has been developed for organizations who are facing a turbulent environment and internal complexity (Amarilli et al., 2017; Benbya & McKelvey, 2006). As discussed in the introduction, COISA originated from the Complex Adaptive Systems (CAS) theory because scholars adopted this theory as a result of the advent of turbulent and rapidly changing environments in which organizations now find themselves (Amarilli et al., 2017; Benbya & McKelvey, 2006).

There are several conceptual models, containing building blocks of COISA, which could be utilized for this research. In the selection of a suitable model, it was examined whether stakeholders play an explicit role. Firstly the model of Benbya and McKelvey (2006) has been examined. This model has three alignment levels; individual alignment, operational alignment and strategic alignment. Stakeholders do not play an explicit role in the model. Instead, different stakeholder groups are discussed that have their own views on alignment. Therefore, it was decided not to use this model for the research. It is difficult to relate stakeholders to the model, which makes it difficult to perform an empirical measurement. Another model that emerged earlier in this research is the model of Amarilli et al. (2017). This model, on the other hand, provides a basis for an empirical measurement. Within this model there are four alignment mechanisms; the business challenges for personnel to innovate the IS, the social component of the organizations actions on IS, and adapts to its changes and the business can leverage and take advantage of the IS to be transformed. However, stakeholders are not explicitly mentioned, which makes this model unsuitable to use. As described in the introduction, many different stakeholders play a role in the context of both COISA and Agile (Balaji & Murugaiyan, 2012; Walraven et al., 2018).

According to Walraven et al. (2018) COISA implies that alignment is a continuous process including two-way interactions between business, IT and external parties and between strategic and operational alignment processes. This definition may provide a holistic understanding of interrelations between different stakeholder groups and strategic and operational alignment processes. In this research only the model of Walraven et al. (2018) is applied because this model provides a holistic view.

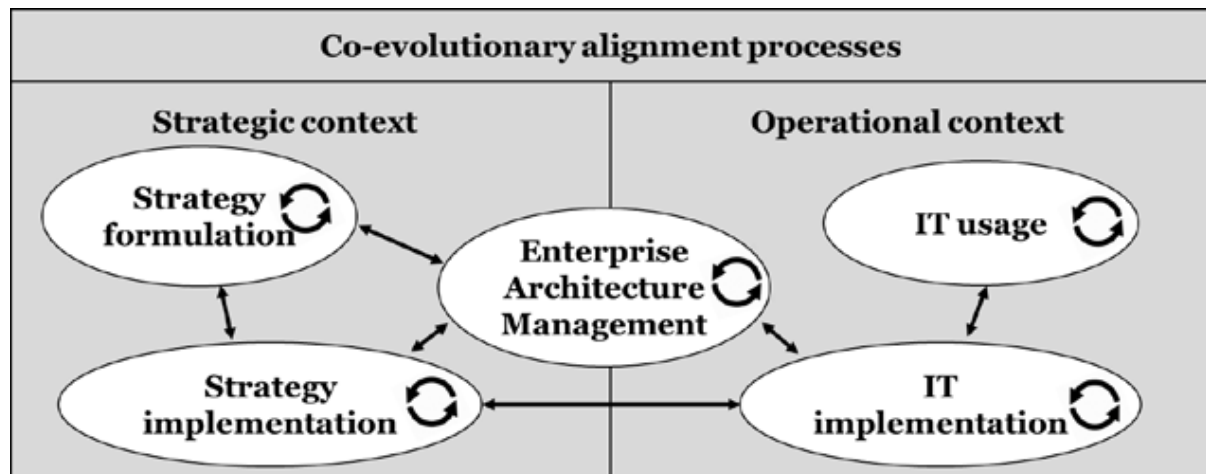The model of Walraven et al. (2018) is as follows:

Figure 1. Co-evolutionary IS-alignment (Walraven et al., 2018)

It is needed to further explain the co-evolutionary alignment processes as these will be investigated in this research. A brief description of each process is described in the table beneath:

Alignment process	Working definition
Strategy formulation	The process of defining strategic objectives that the organization wants to achieve (Liang, Wang, Xue, & Ge, 2017; Walraven et al., 2018)
Strategy implementation	The process of setting up and maintaining structures to ensure that strategic objectives are realized in the operational context of the organization (Liang et al., 2017; Walraven et al., 2018)
Enterprise Architecture Management	The process of managing an organization's architecture (Ahlemann, 2012)
IT implementation	The process of embedding an IT solution within an organization (Walraven et al., 2018)
IT usage	The process of employing a system to perform a task (Burton-Jones & Gallivan, 2007; Walraven et al., 2018)

Table 1. Co-evolutionary alignment processes (Walraven et al., 2018)

These definitions have been adopted from Walraven et al. (2019) for the reason because both this research and the research of Walraven et al. (2019) research is carried out into the manifestation of COISA during the implementation of an IT system. The aim of the model of Walraven et al. (2018) is to map the interactions between stakeholders within and between processes. Therefore, it is very well suited for empirical measurements. As the model takes into account the three different stakeholder groups, i.e. business actors, IT actors and external actors in a complex environment, it fits very well in this research (Walraven et al., 2018).

According to Allen and Varga (2006) alignment is the result of individual interactions at a lower level of aggregation. As discussed earlier, co-evolution is a two-way interaction. Therefore, co-evolution interaction is defined as a mutual influence of the involved stakeholders within an alignment process on IT-related moves or on stakeholders' strategies, goals and needs (Walraven et al., 2019). Again the definition of Walraven et al. (2019) has been adopted because this research assesses and measures the same processes on the same definitions Walraven et al. (2019) used.

In addition to COISA, another important term is Agile software development.

2.3.2 Agile software development

As discussed, Agile software development is a short cyclic manner of working in which all required roles are involved to develop software and which is used to adapt quickly to a rapidly changing environment (Balaji & Murugaiyan, 2012). This is achieved by an adaptive team, represented by all required roles to develop the software, that is able to respond quickly to changing requirements and delivers frequently working software. There is continuous face to face communication between the development team and their clients (Balaji & Murugaiyan, 2012). Small working software is delivered in time periods of weeks and not in months or years, which is the case in the so-called waterfall method. From this research perspective, the definition of Balaji and Murugaiyan (2012) will be used.

2.3.3 Stakeholders in COISA and Agile

It is finally relevant to explain the definition of stakeholder in this study. Within a complex and turbulent environment different stakeholders are involved. In addition, it is necessary to search for relevant stakeholders who are involved in the co-evolutionary interactions within and between the identified alignment processes within both COISA and Agile. A stakeholder can be defined as "any group or individual that can influence or is influenced by the achievement of the organization's objectives" (Freeman & McVea, 2001).

From a COISA perspective, three different stakeholder groups can be distinguished, namely business actors, IT actors and external actors (Walraven et al., 2018). Looking at the literature on Agile, the IT actors can be complemented by the scrum master (Bass, 2014) and the software team (Moe, Dingsøyr, & Dybå, 2010). In addition, a role in Agile is reserved for the product owner (Sverrisdottir, Ingason, & Jonasson, 2014). This stakeholder can be represented from any stakeholder group as defined from the perception of Walraven et al. (2019) (Sverrisdottir et al., 2014). Currently, the literature shows that these stakeholders play little or no role in the co-evolutionary business processes (Gill, Smith, Beydoun, & Sugumaran, 2014). In literature, few connections are found between Agile and the co-evolutionary business processes. The literature shows that Agile, and with its stakeholders, occurs in the co-evolutionary business process of IT implementation (Gunasekaran, 1998; Jyothi & Rao, 2011; Paetsch, Eberlein, & Maurer, 2003). Upon research, it will be revealed whether these stakeholders also occur in other co-evolutionary business processes and can be an addition to the existing literature.

2.3.4 Connection between COISA and Agile

An organization in which software is developed using an Agile approach is a good way to do research into how COISA manifests because both theories want to achieve alignment between business and IT. Next to that, within both theories, continuous communication is a goal and tool to achieve an optimal alignment to achieve an optimal functional system in the end (Balaji & Murugaiyan, 2012; Walraven et al., 2018). Furthermore, as said, Agile is a way of working which is suitable and used for complex organizations in which many stakeholders are involved in a rapidly changing environment in which quickly adaption is required (Balaji & Murugaiyan, 2012). This links the philosophy of COISA in which an important characteristic is the turbulent quick changing environment an organization is in. At last, in literature much has been written on how Agile must be performed (Boehm, 2002; Fernandez & Fernandez, 2008; Fowler & Highsmith, 2001). However, it is very hard to find any

literature on the relationship between COISA and Agile, and especially in the context of developing software using an Agile approach. Existing literature shows few links between co-evolutionary business processes, formulated by Walraven et al. (2019) and developing software with an Agile approach. Gill et al. (2014) for example, describe that there is a missing link between enterprise architecture and Agile software development in organizations. This may lead to a number of problems such as technical debt, unnecessary re-work, inconsistent communication, locally focused isolated architecture, design and implementation. Organizations struggle with how to best to approach their strategic enterprise architecture capability for supporting Agile development. On the other hand, plenty is written about the link between IT implementation and Agile. The Agile way of working has a positive influence on the interactions between stakeholders within the IT implementation process. People talk more to each other and align better before developing any software (Gunasekaran, 1998; Jyothi & Rao, 2011; Paetsch et al., 2003). With regard to the other processes nothing in literature can be found on the influence of Agile on the interactions. Following the development of more interaction between stakeholders within the IT implementation process it is also expected that this will happen in the other processes.

The aim of this study is to find out whether there are differences in how COISA manifests itself in an organization that previously did not operate Agile and is currently operating Agile. This is relevant because more empirical evidence can be found which may underpin the model of Walraven et al. (2018).

3. Methodology

This chapter describes the selected method in the study. Subsequently, an explanation will be given of how the data was collected and analysed, taking into account validity, reliability and ethical aspects.

3.1 Research approach

A large financial service provider in the Netherlands was studied, consisting of approximately 3,000 employees, who provides board advice, asset management, pension administration, pension communications and employer services. During the research, August until November 2019, a part of the organization was in an Agile transition. This was an opportunity to investigate COISA both before and during the transition. The transition included the IT Back Office (BO) department of the Asset Management business unit. This department is, inter alia, responsible for the accounting system Geneva, which went live in January 2019 after a seven-year migration. This migration was completed in the so-called CFAR project. One of the elements of this project was the migration from the old accounting system PAM to the new system Geneva. During the investigation, the organization utilized the new system. After the GO live, various change requests and maintenance tasks emerged in a complex environment with many different stakeholders with different goals. In March 2019, the team responsible for the maintenance and further development of Geneva started working Agile. In addition to Geneva, research is also being conducted into the influence of Agile on the management and further development of the FrontInvest system. The system has been implemented in 2012. The team responsible for this is the first team in the organization that started Agile working in a pilot in 2017.

3.2 Data collection

Data was collected by secondary data and semi-structured interviews. Semi-structured interviews have been used because this provides an insight into the reasons for decisions and the reasons for the attitudes and opinions of the participants (Saunders et al., 2016). Secondary data because this provides additional and different knowledge, interpretations and conclusions (Saunders et al., 2016).

Five interviewees were selected for the ability to look back retrospectively on the situation before and during Agile, for intensive involvement in multiple alignment processes in which they made decisions and/or for having a broad perspective on the implementation of Geneva and FrontInvest, ensuring each process is represented by one or multiple stakeholders. In addition, persons have been selected who have been working for the company over many years and who have already held several positions within the company. As a result, they have a high level of business knowledge and are well aware of the company's history. For Geneva, four stakeholders were interviewed who, during the implementation and now the maintenance and further development of Geneva, together represent all alignment processes. In the context of FrontInvest, one person was interviewed who has been closely involved in the Agile implementation from the start. This person was interviewed because this person is much further ahead in the Agile transition and therefore has a clear insight into the changes with regard to Agile working.

The interview questions are based on the research of research of Walraven et al. (2019) as this research, discussed earlier, has the same scope. In this way bias is avoided and internal validity is increased (Saunders et al., 2016). Appendix C contains the interview questions. In order to achieve reliability, appropriate persons were interviewed. These were persons who were actively involved in a process and had an influence on a process. In order to avoid bias, probing questions were also

asked that required a certain focus (Saunders et al., 2016). Selection criteria for interviewees were interviewing people who had a broad overview of a process and people who had influenced a process.

Table 2 gives an overview of which persons have been interviewed and which process(es) they represent. Additionally, it also shows which secondary sources were used.

Co-evolutionairy alignment process	Technique	Resource
Strategy formulation	Secondary data Secondary data Semi-structured interview Semi-structured interview Semi-structured interview	Strategy document Back Office Asset Management IT (BO AM IT) Roadmap BO AM IT Business Manager BO AM IT Product owner Geneva Architect Geneva/Business Developer Geneva
Strategy implementation	Semi-structured interview Semi-structured interview	Business Manager BO AM IT Product owner Geneva
Enterprise Architecture Management	Semi-structured interview Semi-structured interview	Architect Geneva/Business Developer Geneva Business Consultant Geneva
IT usage	Semi-structured interview Semi-structured interview	Product owner Geneva Business Analyst/Operations
IT implementation	Semi-structured interview Semi-structured interview	Product owner Geneva Business Analyst/Operations

Table 2.   Collecting the data

The data collected on Geneva has been analyzed in order to formulate results on the influence of Agile working on COISA. The data on FrontInvest is used to obtain information about the changes, positive or negative, that have occurred after the implementation of the Agile working method.

3.3   Data analysis

The qualitative data of the interviews have been audio recorded and transcribed in order to stay as close as possible to reality and therefore increase reliability (Saunders et al., 2016). Permission was requested from each interviewee before the interview was recorded. Each transcribed interview is stored as a separate word-processing file with a confidentiality file to preserve anonymity. The interviews have been transcribed by typing them out completely. This is done to obtain a complete picture of what the interviewees were saying and how they intended it (Saunders et al., 2016). Each interview was transcribed immediately after recording in order to avoid a whole pile of unfinished

interviews. Within all transcription topics are written in capitals, questions in italics and responses in normal font to make a visible distinction.

Thereupon the data is coded to categorise data with similar meanings (Saunders et al., 2016). Due to lack of time to master specific encoding tools, it was decided to use Excel. Excel is an accessible application that offers the necessary functionality for coding. Out of a deductive analysis approach every co-evolutionary alignment process is labelled as a unique code and has its own working definition. In addition, every stakeholder as defined in the theoretical framework was labelled (Saunders et al., 2016). From an inductive approach, new labels have been identified. These concern the labels benefits Agile working, drawbacks Agile working and new stakeholders (Saunders et al., 2016). To illustrate some examples of coding:

Code	Label	Text passage
65	Co-evolution within EAM **while** working Agile	*"Not now. Now there are no alignments on Geneva architecture. This is due to a lack of staff."*
85	Co-evolution between strategy implementation and EAM **while** Agile working	"*I don't know whether there is a strategy other than the one formulated in the project, but of course the project was formally completed this year. And at the beginning of the year we started working Agile. The extent to which this alignment between architecture and strategy exists and whether it has existed at all, needs to be brought back to life."*
44	Co-evolution within IT implementation **before** working Agile	"*So then internal business analyst wrote that proposal in a business analyst document. Then he agreed with Reporting and Accounting & Control of guys this is how we can solve it. ...So yes well he discussed that and yes when we agreed the consultant of the external supplier was commissioned to build it*."

Table 3.   Coding

3.4   Validity, reliability and ethical aspects

The purpose of this study is to investigate the difference between the manifestation of COISA in an Agile environment and a non-Agile environment. A single case study, in which qualitative data is gathered, has therefore been carried out because this generates insights from intensive and in-depth research into the study of a phenomenon in its real-life context, leading to rich, empirical descriptions (Saunders et al., 2016; Yin, 2018). Criticism of this method is the lack of producing generalizability, also referred to as external validity (Saunders et al., 2016). However, generalizability is less important in this study because it is an interpretative study in which the aim is to create a new, richer understanding and interpretation perspectives of how COISA manifests itself in an Agile organization and which different groups of people are involved (Saunders et al., 2016). This is in contrast to quantitative research in which it is important to know whether the results of a small group may also apply to a large group. From the perspective of theory development, an abductive approach is used, because COISA is an existing theory which is being investigated and data is used to investigate COISA and whether or not build upon COISA (Saunders et al., 2016).

4. Findings

The involvement of stakeholders will be discussed in the chapter. Subsequently, the co-evolution within and between the alignment processes will be discussed. On the one hand in case the organization is not working Agile, on the other hand the organization is working Agile.

4.1 Stakeholder involvement

Data from both Geneva and FrontInvest show that there is a different stakeholder group involved in every alignment process before and after Agile working. Based on the Geneva data, we have illustrated two tables. Table 4 shows which stakeholders were involved in the implementation of Geneva before Agile. Table 5 shows which stakeholders are involved in the management and further development of Geneva now that Agile is in operation.

COISA process Stakeholder	Strategy formulation	Strategy implementation	Enterprise Architecture Management	IT implementation	IT usage
External IT consultants			X	X	X
IT management	X	X	X		
Lead business analysts	X	X	X	X	
Project manager	X	X	X	X	
Architect	X	X	X		
Executive Management	X	X			
Project steering committee	X	X			
Operations management	X	X	X	X	
Migration manager			X		X
External vendor	X	X	X	X	
End user/core user				X	X
Senior user	X	X	X	X	X
ICT employees			X	X	

Table 4.   Stakeholder involvement in every alignment process before Agile working

COISA process Stakeholder	Strategy formulation	Strategy implementation	Enterprise Architecture Management	IT implementation	IT usage
Product Owner					
Scrum team					
Scrum master					
External IT consultants					
External vendor					
End user					
Team manager Operations					

Table 5.   Stakeholder involvement in every alignment process while working Agile

The results show that before working Agile, stakeholders at a higher level in the organization were involved in the decisions in the various alignment processes. An example from one of the interviews is the alignment on architecture. In a project structure consisting of a senior user (team managers Operations), a project manager, the head of Operations and a migration manager, it was decided to migrate per product. The core user (the end user of Geneva) was not directly involved in this decision. The senior user requested input from the core user, after which the decision was made in the project structure. Now that Agile is being worked on, this project structure has disappeared, according to a quote from a core user: "*Uh yes, well, what is important is that the CFAR project in which Geneva is being implemented has ended. So what used to apply in project organizations, the way of working, is that if you wanted to get important change through, you talked to your senior user and the project manager, for example. That structure is no longer there.* ".

An example of Agile working is the introduction of a new product in Geneva; Tri Party Repo. This product touches different systems and alignment has taken place in different ways. First of all, the business (end user) has requested that this product be upgraded. The end user has discussed this with his team manager in which they have made a translation to IT to see if it is possible. The team manager then went on to submit this to the product owner. The product owner has first determined that there is enough business value to pick up this item. Next, the product owner and the product owners of the other systems started to align to see how this implementation between the different systems can be realized.

Analysis has shown that before working Agile, top-down decisions were made. There was a different stakeholder set-up. There was a project structure with stakeholders involvement on a high level in the organization. Currently, there is no project structure anymore and stakeholders at a lower level of the organization are involved. Two scrum teams, including two scrum masters, have been set up to maintain Geneva and develop new software. The product owner determines the business value and the priority of every issue. As a consequence, there is less hierarchy and there is more alignment between different stakeholders at a lower organization level. To illustrate this, a quote from the interview about Geneva: "*Your dialogue has been reshaped. In the form of the project, it was still*

quite directive. And in the Agile way I would call it is more organic. The directive is really top-down. And, if necessary, escalated. And now at every level, alignment is sought horizontally. So in width. So if the PO thinks he needs to discuss something with a team manager, it's up to him to do so.".

Finally, there is also a difference in the number of external stakeholders. Many external stakeholders were involved in the implementation of Geneva. To illustrate this, one interviewee said: "*And in the past, uh, we wanted everything and then we just scaled up with resources and then I look at CFAR. The number of externals that were here was just bigger than the number of interns.*". After the implementation of Geneva, the number of externals was reduced. Now that Agile is being practiced, Geneva is mainly maintained and further developed by internal employees.

4.2   Co-evolution within alignment processes

As discussed previously, research has been done into co-evolution within the various alignment processes. The results describe for each alignment process the co-evolution before Agile working and now that Agile is being worked on.

4.2.1 Strategy formulation

Before working Agile there are indications for co-evolution within the strategy process. A project group has been set up to investigate what a good accounting system would be. This included for example heads of, project managers, lead business analysts, architects and the management of operations. The business was represented by a senior user i.e. team manager in operations. Decisions were taken at a high level in the organization. A quote from an interviewee as an example: "*The COO has established that the IT landscape is not at the level of an Asset Management organization what you would expect. Extremely much Excel, which, by the way, is what a lot of Asset Management companies have. So the COO actually announced a transformation program that included several trajectories. One of them was for example (…). But the biggest part of it was CFAR and roughly meant the replacement of the old accounting system PAM by Geneva, but also everything around it. The decision to implement Geneva was made by the COO and the steering committee.*".

While working Agile there is no co-evolution taking place within the process of strategy formulation on Geneva, because there are no interactions taking place about it. To illustrate this, a quote from an interviewed person: *"At the moment, it's not a topic of discussion. Otherwise, we will continue to work in Geneva until further notice. The choice of Geneva is not questioned. Also not assessed.".*

4.2.2 Strategy implementation

Before working Agile, indications were found for co-evolution within the process strategy implementation. The same stakeholders as in strategy formulation were also involved in strategy implementation. To illustrate, a text passage from an interviewee: *"There was the Board of Directors. Programme board that reported to the Board of Directors, which was operations management, and the program manager, which were actually the project managers and under the programme board you had the project steering committee and below that the PMT (Project Management Team) the real daily project steering body. The PMT was the real daily project steering body in which matters were discussed and, if necessary, adjusted on a daily basis. Programme board consists of project managers, IT management and a few other managing directors of uh IT, well all those disciplines.".* Co-evolution for example took place on the budget: *"In principal, CFAR had a lot of delays. In total, it took seven years. That has happened frequently and a lot of budget had to be*

added. Only in the last two years it has been very limited. Then we simply persuaded it. That has happened many times.".

While working Agile there is no co-evolution taking place within the process of strategy implementation. Interviewees explained that there are no interactions about the implementation of Geneva due to the fact that Geneva has already been implemented. To illustrate: *"Now it's not happening. We barely have any projects left."*.

4.2.3 Enterprise Architecture Management

Before Agile we found indications for co-evolution within the EAM process. A project structure with an enterprise architect, a lead business analyst, IT management and operations management aligned on how data on trades and transactions buy sells should flow into Geneva. External consultants of the vendor aligned with IT employees. Subsequently the vendor made a proof of concept. A quotation of the vendor explained this further: *"What was often done is that a proof of concept was done so to determine if this seems to be the right direction. Let's do a little setup to see if we don't come across some bears. So the proof of concept model. I was always charmed by that because it just allows you to make certain things visible."*.

While working Agile there are mixed results on co-evolution within EAM. As said by the head of the Back Office IT there is no architecture involved at the moment: *"Not now. Now there are no alignments on Geneva architecture. This is due to a lack of staff."*. On the other hand, another interviewee explained that a so-called architecture group was set up on the initiative of a number of people in the organization. This group brings together various parties such as the product owner, a business analyst and an operations employee to discuss architecture and to examine how architecture should be aligned while working Agile. To illustrate, a quote from an interviewee: "*Well it's about how architecture works within Agile working. How we do it. Where do you actually invest the architecture function in a Value Stream? That sort of things, so really the link with working Agile*". However no architect is involved in this group. Because of this lack we classify no co-evolution at the moment within enterprise architecture management.

4.2.4 IT implementation

Both now that Agile is being worked on and before Agile was worked on, indications for co-evolution have been found. However, co-evolution now is more efficient and much higher due to much more interactions between the right stakeholders. The stakeholder tables show, for example, that the head of operations is no longer involved. In the Agile way of working a scrum team is set-up with all needed disciplines to build functionalities. Due to this set-up people are sitting together and align together on the new functionalities. Communication is more direct. Previously a business analyst set-up requirements after spoken to the business. Then, the business analyst spoke to the developer and the developer started building. If the developer ran into questions, he consulted the business analyst who then talked to the business. As said by an interviewee: "*So then internal business analyst wrote that proposal in a business analyst document. Then he agreed with reporting and accounting & control of guys this is how we can solve it. ...So yes well he discussed that and yes when we agreed the consultant of the external supplier was commissioned to build it*.". Consequently, there was no communication between the business and the developer. Due to the set-up of a scrum team there is more interaction between the developer and the end user which results in a faster and correct delivery.

In addition, it was formerly the authority to decide whether a certain functionality or report should be developed was unclear, and eventually appropriated on the basis of hierarchy. This could be the

project manager or a senior business analyst within the IT department. Now it is clear to everyone where this empowerment lies and this is only with one person, the product owner. A quotation of an interview as follows: "*And now that we're working Agile, now that we have a PO, if he decides we're not gonna do this. Then he'll have to sell that to the business why we're not gonna do it. And I used to think that it was actually very unclear who should make that decision for Agile. That wasn't clear to me. So I think that's an advantage.*". However, the product owner agrees with his stakeholders about the business value and priority. Based on this, a backlog is formed in which so-called user stories are prioritized. User stories describe the task to be performed. This is a task for two or three weeks. The scrum team then picks up these user stories in sprints. Another advantage of Agile that there is now transparency on the work load.

4.2.5 IT usage

Within IT usage co-evolution is found both before Agile and after implementing Agile. The results show co-evolution increased now Agile is being worked on.

Previously there were discussions between the core user i.e. end user, senior user and the migration manager. To illustrate: "*The user usually had conversations with the senior users about their findings of uh Geneva and all Recons. Uhm yes these were shared and then discussed together with the senior user. This included the core user with e.g. the migration manager. And uh yeah there were actions set of uh yeah this needs to be corrected or that. That was always in consultation with the senior user. That was a very important stakeholder for the core user*".

Now that Agile is being practiced, not only stakeholders of the business i.e. end user and senior user but also the scrum team including the PO are involved in discussions about findings from Geneva. These discussions take place about newly built functionalities or incidents. To illustrate, a quote from a team member of the scrum team who held the position of end user during CFAR: "*Now, in my opinion, there is only alignment when there are incidents, because all processes are running. I am now on the side of IT and I only get incidents, i.e. issues that don't run properly. Because we started working Agile, we are prioritizing the business value higher. That is very important to us. At the end of each sprint, we have a review meeting in which the stakeholders of the business are invited and we go through all the changes we have made for them. This way you get feedback and a sense of what stakeholders think of Geneva and changes*". This shows that there is now more frequent and more direct alignment about the built functionalities. For example: "*There was a user story that the business analyst of team accounting had picked up and asked for an overview of all outstanding Tax Reclaims by a pension fund. They wanted to see the progress of all Tax Reclaims. I then wondered what the added value of this was. Coincidentally, the team manager of accounting and control operations was in that meeting as a stakeholder and he also had something of a legitimate question. Course of Tax Reclaims is that a nice to have that the customer makes or a must to have. But I don't think we had made that distinction so that report is now being made but actually it doesn't really help you that much...*".

4.3   Co-evolution between alignment processes

Before working Agile, there was some co-evolution between the processes in the strategic context. Between the processes strategy formulation and strategy implementation there is mainly one-way interaction. Although the same stakeholders were involved in both processes, the decision to implement Geneva was taken by the COO and the project steering committee. The other stakeholders in this process were involved, but did not have a decisive voice. Between the processes strategy formulation and strategy implementation on the one hand and EAM on the other hand,

there was also only one-way traffic. Despite the architect was involved in the project group in which the strategy is formulated, the choice of the system is determined by Executive Management so the architect had no voice. In addition, it was mainly the project managers who steered the implementation of the strategy in a project-based manner.

Now that Agile is being used, no co-evolution has been found between strategy formulation, strategy implementation and EAM, because strategy formulation and strategy implementation do not currently play a role due to the phase in which the system is in, i.e. the management and further development phase. This is apparent from a quote from one of the interviewees: "*I don't know if there is a different strategy than that formulated in the project, but of course the project was formally completed this year. And we started working Agile at the beginning of the year. The extent to which this alignment between architecture and strategy exists, and whether it existed at all, needs to be brought back to life*". In addition, EAM does not play a role due to the absence of an architect.

Co-evolution between IT implementation and IT usage is found in both Agile way of working and before Agile way of working. However, COISA now takes place much more often than it did when Agile was not in use. There are more interactions between the right stakeholders and the stakeholders are at a lower hierarchical level. As one of the interviewees shows: "*Uh, let's go to the end users. Previously, this was done via the senior user. The senior user was actually the voice for them and they went to the IT department to try to regulate capacity. On the one hand, that is still the case, isn't it? That this is done via the senior user, now called team manager. On the other hand, they have a lot of direct links with me as a product owner, but also with the team members and in fact a lot is already laid out there, especially when it comes to small changes that do not directly contribute to large epics or features. These are aligned much more directly to each other. They are jointly prioritized and picked up by the team.*". Another statement of an interviewee: "*Previously, the link between the business and IT was the business analyst. He or she talked to the business, drew up requirements and then presented them to the developers. This intermediary meant that there was no direct link between the business and the developer. The current set-up shows that this is exactly what it is. The business analyst is in the scrum team together with the developer and the end user is now going to talk to the business analyst and developer or there is even a conversation between only the developer and the end user.*". In both situations, Agile and non-Agile, there are two-way interactions. However, now that Agile is being used, these interactions and collaboration take place directly and there is no longer a business analyst acting between the business and the developers.

Before Agile there was co-evolution between EAM, IT usage and IT implementation. Stakeholders were involved at different levels in the organization. Core-users conceptualized how products should be migrated from the old accounting system to the new accounting system. An interviewee core-user defined himself as: "*I was in the project as a core user. That's actually the lowest level. The core users are the people who are involved in the project from the business and who are really the users of the system.*". Thereupon the senior user (team manager of the end user) represented these concepts from the end-user in a project group which involved operations management, Architect and a migration manager/project manager. The migration manager/project manager then talked to the IT specialists and the IT specialists then talked to the external supplier of Geneva. So, external consultants of the vendor aligned with IT specialists. IT specialists talked to the external consultants about their wishes. Subsequently the vendor made a proof of concept that was then submitted to the IT specialists.

Currently there is no co-evolution between EAM, IT usage and IT implementation due to the absence of an architect and consequently no co-evolution within enterprise architecture management.

5. Discussion, conclusions and recommendations

This chapter contains conclusion on the results. These conclusions will be linked with existing literature and recommendations for further research will be given.

5.1 Conclusions

The research question states as follows: "*What is the difference between how COISA manifests itself in an organization that does not work Agile and in an organization that works Agile?*". In this section the research question will be answered.

The research question will be answered in three parts. A comparison will be made between the situation in which Agile was not used and in which Agile is used in the area of stakeholders, co-evolution within the alignment processes and co-evolution between the alignment processes.

Out of research it can be concluded that stakeholders play a role before working on Agile and now working on Agile. However, there are differences. First of all, before working with Agile, stakeholders are, in the processes IT usage and IT implementation, involved at a higher hierarchical level in the organization. Now that Agile is being worked on, stakeholders do play a role at a lower hierarchical level in the organization. For example, the stakeholder migration manager within alignment on IT usage and the project manager within IT implementation both disappeared. In the processes strategy formulation, strategy implementation and EAM stakeholders have been identified before working Agile, but not while working Agile. The identified stakeholders are stakeholders at a high hierarchical level in the organization. Secondly, now that Agile is being worked on, fewer different stakeholders play a role. The most important stakeholders in the field of software development are the scrum team, scrum master plus the product owner and the customer who can be anyone in the organization who wants a change in the system.

In the alignment process IT implementation, there is a positive difference in co-evolution now that Agile is being worked on. As a result of working Agile, co-evolution is more efficient and higher because there are many more interactions and these interactions now take place between the right people. The scrum team that develops software is now talking directly to the end user. The co-evolution within the alignment process IT usage has also increased. Again, now that Agile is being used, more interactions are taking place and these interactions are taking place between the right stakeholders. The end users discuss their findings about the functionalities directly with the scrum team. Before working Agile, co-evolution took place in the processes strategy formulation, strategy implementation and EAM. Now that Agile is being used, no co-evolution takes place within these processes.

Both before working Agile and now working Agile, there was co-evolution between IT usage and IT implementation. However, there is more co-evolution taking place now Agile is being used. Before working Agile, the end user mainly consulted with the so-called senior user i.e. team manager. Subsequently, the senior user went to the IT department and hoped that the issue that the business was encountering would be addressed. The issues mainly went to the seniors in the IT department and they decided whether or not the issue would be taken up. Again, in the past, decisions were taken on the basis of hierarchy. Now that Agile is being used, it is clear where the team manager can turn to for the issue and that is the product owner. Now there is transparency and ownership. The roles in Agile are clear. The business knows it has to contact the product owner regarding functionality in Geneva. Whereupon the product owner prioritizes requests based on business value. In addition, all requests from the business are digitally administered at the backlog of the team, so all requests remain visible. Previously, it was not clear who the team manager should turn to. It can

be concluded that the co-evolution between these processes has increased as a result of changes in the working method. Before working Agile, there was co-evolution between the processes strategy formulation, strategy implementation and EAM. However, this mainly involved one-way interaction from the COO and the project steering committee. Now that Agile is being used, there is no co-evolution between these processes due to the lack of co-evolution within the processes.

5.2   Discussion and reflection

In the past, Walraven et al. (2019) investigated the manifestation of COISA during the implementation of the Electronic Medical Records in three hospitals. One goal of this research was to find more empirical evidence to substantiate the COISA model of Walraven et al. (2019). This research took place in a complex environment with many stakeholders. Research has shown that the Walraven et al. (2019) model is a useful model for mapping COISA. It was possible to investigate COISA in all processes. The evidence for this can be found in the results.

The other aim of this study was to identify the differences between how COISA manifests itself in an Agile organization and an organization that does not work Agile. In this study, in both situations, working Agile and not working Agile, COISA was identified. However, COISA was not found in all alignment processes in the case of Agile working. This differs from the investigation of Walraven et al. (2019) in which COISA is experienced in all alignment processes during all three implementations. There is a possible explanation for this. The situation in which the organization works Agile COISA has not been identified in the processes strategy formulation and strategy implementation. It is indicated that this is due to the phase Geneva is in during this research is conducted, namely the management and further development phase. In other words, this does not imply that COISA cannot occur in these processes. In the literature nothing has been found on the influence of Agile on strategy implementation and strategy formulation. Therefore it is interesting to do further research into this. In addition, no co-evolution has been found within EAM in case Agile is used. However, there are a number of explanations for this. Gill et al. (2014) describe that organizations do not know how to deal with EAM in an Agile context and therefore do not involve EAM in an Agile organization. The results of this research also show that the organization is seeking ways to align on architecture. In addition, the fact that there is currently no architect available also plays a role in the inability to align on architecture. However, this does not mean that COISA cannot occur in EAM. It is therefore interesting to do more research into this gap in the literature.

Previous research shows that Agile has a positive influence on the interactions in IT implementation (Gunasekaran, 1998; Jyothi & Rao, 2011; Paetsch, Eberlein, & Maurer, 2003). This study also shows that COISA within IT implementation increases as a result of Agile working. The interactions take place more often and they take place between the right stakeholders who are directly involved in the implementation of IT. The studies of Gunasekaran (1998), Jyothi and Rao (2011) and Paetsch et al. (2003) show that stakeholders in the Agile context only play a role in IT implementation. This study showed that stakeholders in an Agile context i.e. product owner, scrum master and scrum team also play a role in the process of IT usage and there is co-evolution. This is a contradiction. It is interesting to investigate this further and gather more empirical evidence. Finally, co-evolution has been found between IT usage and IT implementation now that Agile is being used. This is in line with the investigation of Walraven et al. (2019). The finding that there is co-evolution between IT usage and IT implementation in an Agile context can be added to the existing literature, because no existing literature has been found on this. It is interesting to do further research into this as well in order to collect more empirical evidence.

5.3   Limitations and recommendations

This study shows that the model of Walraven et al. (2019) can be applied in both situations; a situation in which an organization does not yet work Agile and a situation in which the organization does work Agile. However, a number of limitations have been encountered.

The data has been collected through retrospective interviews. These have been collected from five people in the organization. Although representative interviewees were selected, it is difficult to generalize the answers given for the other employees within the organization. In addition, the subjectivity of the interviewees plays a role in their answers. Interviewees could be influenced or politically coloured. In addition, the reliability of a retrospective interview is endangered by a retrospective bias, for example by omitting or distorting past events (Shachar & Eckstein, 2007). In a later study, more people could be interviewed to validate the data and increase reliability. In addition, the researcher also interpreted the data in a certain way. Another researcher could have used other parts of the data and/or could have interpreted the (used) data in a different way.

Another limitation is the time at which the research was carried out. In 2017, the first department started a pilot Agile working. One person from this department was interviewed. The rest of the organization, the other IT departments, started working in Agile in March 2019. The interviews revealed that people are still in the transition phase of Agile working. This means that the Agile working method has not yet been fully implemented and that it was sometimes difficult for interviewees to make a clear comparison between working on a project basis and working on an Agile basis. In addition, the Geneva system went live in January 2019 and entered the management and further development phase. This made it difficult to make a clear comparison for some alignment processes, because some processes no longer play a role, such as strategy formulation and strategy implementation. In addition, operations does not work Agile. This means that nothing has changed within their own department and that it was sometimes difficult for them to make a sharp comparison between before and after. A subsequent study could be conducted if the Agile working method is fully implemented, enabling a more accurate comparison to be made.

Finally, the question regarding whether there is co-evolution within enterprise architecture management now that Agile is being used, was not answered unequivocally. Based on the fact that there is currently no architect available for Geneva, it was decided not to classify co-evolution within this process. In a subsequent study, more people could be interviewed in order to formulate a more unambiguous answer.

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Appendix A   Overview search method

	Co-evolutionairy IS-alignment		Agile software development		Business IT alignment	Element
⇕OR	- COISA - Co-evolution	AND ⇔ ⇕OR	- Agile strategy - Agile Enterprise Architecture Management - Agile - IT implementation Agile - Agile software development	AND ⇔ ⇕OR	- BITA - Business IT Alignment	- Abstract - Title

Appendix B   Articles used within the study

1. Ahlemann, F., Legner, C. and Schäfczuk D. (2012). What is enterprise architecture management?
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5. Bass, J. M. (2014). Scrum master activities: process tailoring in large enterprise projects.
6. Benbya, H., & McKelvey, B. (2006). Using coevolutionary and complexity theories to improve IS alignment: a multi-level approach.
7. Burton-Jones, A., & Gallivan, M. J. (2007). Toward a deeper understanding of system usage in organizations: A multilevel perspective.
8. Freeman, R. E., & McVea, J. (2001). A stakeholder approach to strategic management.
9. Gill, A. Q., Smith, S., Beydoun, G., & Sugumaran, V. (2014). Agile enterprise architecture: a case of a cloud technology-enabled government enterprise transformation.
10. Gunasekaran, A. (1998). Agile manufacturing: enablers and an implementation framework.
11. Jyothi, V. E., & Rao, K. N. (2011). Effective implementation of agile practices.
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13. Moe, N. B., Dingsøyr, T., & Dybå, T. (2010). A teamwork model for understanding an agile team: A case study of a Scrum project.
14. Paetsch, F., Eberlein, A., & Maurer, F. (2003). Requirements engineering and agile software development.
15. Sverrisdottir, H. S., Ingason, H. T., & Jonasson, H. I. (2014). The role of the product owner in scrum-comparison between theory and practices.
16. Walraven, P., van de Wetering, R., Helms, R., Versendaal, J., & Caniëls, M. (2018). Co-evolutionary IS-Alignment: A Complex Adaptive Systems Perspective.
17. Walraven, P., Van de Wetering, R., Versendaal, J., & Caniëls, M. (2019). USING A CO-EVOLUTIONARY IS-ALIGNMENT APPROACH TO UNDERSTAND EMR IMPLEMENTATIONS.

Appendix C   Interview questions

1. What is or has been your role within APG Asset Management and how long have you been working here?
2. Why has it been decided to start working Agile and what was/is the goal of implementing the Agile working method?
3. How was there alignment about Geneva/FrontInvest in the area of architecture for the implementation of Agile? Which stakeholders were involved and in what way? What changed after alignment between the different stakeholders?
4. How does the alignment about architecture after the implementation of Agile take place? Which stakeholders are involved and in what way? What changed after alignment between the different stakeholders?
5. How was there alignment about Geneva/FrontInvest in the area of strategy for the implementation of Agile? Which stakeholders were involved and in what way? What changed after alignment between the different stakeholders?
6. How does the alignment about strategy after the implementation of Agile take place? Which stakeholders are involved and in what way? What changed after alignment between the different stakeholders?
7. How did alignment take place between stakeholders involved in the different areas of architecture and strategy? How did this happen before and after the implementation of Agile? What changed after coordination between the different stakeholders?
8. How did end users align Geneva/FrontInvest for the implementation of Agile? Which stakeholders were involved and in what way? How is this after the implementation of Agile? Which stakeholders were involved and in what way? What changed after alignment between the different stakeholders?
9. How did software developers align Geneva/FrontInvest for the implementation of Agile? Which stakeholders were involved and in what way? How is this after the implementation of Agile?
10. How did the stakeholders involved in the different areas of architecture, strategy and IT align? Which stakeholders were involved? How did this alignment take place before and after the Agile implementation? What changed after alignment between the different stakeholders?
11. Are there any other relevant stakeholders involved in the Geneva/FrontInvest alignment? How did they align Geneva/FrontInvest for the Agile implementation and now Agile is implemented?
12. Which issues have changed and which issues have not changed with respect to the alignment about Geneva/FrontInvest before and after the implementation of the Agile working method (in terms of interactions between people)? Why have these things changed or not?

Additional questions

13. To what extent has the goal of working Agile been achieved so far? Which goals have been achieved and which have not been achieved for Geneva? What is the influence of Agile on whether or not these goals have been achieved for Geneva?