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Co-evolutionary IS-alignment in SAR implementations

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Co-evolutionary IS-alignment in SAR implementations

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Abstract

This study was focused on the following question: how does co-evolutionary IS-alignment manifest in SAR implementation? This study builds further upon the scientific relevance to better understand the co-evolutionary IS- alignment in complex organizations. The specific complexity lies here in Spend Analytics and Reporting (SAR) implementations, where IT, the business and other stakeholders need to cooperate during different alignment processes. Previous SAR studies mainly focussed on the success factors of implementations and tended to neglect the complex context (Tabak, 2016; Villamarín & Diaz Pinzon, 2017). COISA (Walraven, van de Wetering, Versendaal, & Caniëls, 2019) is in this study therefore used as a conceptual and holistic model to research this gap. This because in contrast to other models COISA specifically focusses on both the operation and strategic context of multi-content and multi-stakeholder implementations. By assessing the two-way interactions within and between five alignments processes namely, strategy formulation, strategy implementation, enterprise architecture management, IT implementation and IT usage, followed by analyzing it in a three-step approach we aimed to better understand the co-evolutionary interactions between the stakeholders. Our results indicate that COISA is manifesting differently in SAR implementation compared to EMR implementations mainly because of the different RACI roles and expertise of the stakeholders during the alignment processes. Next to that our study addresses the contextual complexity during those implementations providing organizations a basic understanding and opportunity for better decision making during SAR or BI&A implementations.

Key terms

COISA, SAR implementation, Co-evolution, IS-alignment.

Summary

In this fast-changing world, companies are now more than ever required to change in a faster and more frequent way. This external change also reflects itself internally where companies are not always ready for this disturbance. It forces the business and IT to work closer together in search of Business-IT alignment (BITA), applying IT in an appropriate and timely way, in harmony with business strategies, goals, and needs. The by the years developed BITA models are currently being questioned by their applicability in the complex organizational landscape of today. How does this co-evolutionary alignment process manifest? In this research, we specifically focus on Spend Analytics and Reporting (SAR) implementation. A rather complex implementation given the fact that multiple mutually not cooperating stakeholder groups need to work together. The research question we, therefore, answer during this research is as follows:

How does co-evolutionary IS-alignment manifest during SAR implementations?

Based on the COISA model a further in-depth understanding is given about the stakeholder interaction during five different alignment processes within SAR implementations. The output of our single, semi-structured case study has been analyzed via a three-step coding approach. With this research, we partly aimed to understand the differences in the manifestation of SAR implementations compared to EMR implementations. Our results show that COISA is manifesting differently in SAR implementations since in every alignment process we found, depending on the different responsibility, accountability, consult or inform (RACI) roles a different manifestation. The most co-evolution was found in the enterprise architecture management and IT implementation process since many stakeholders during these processes fulfilled roles that required a two-way interaction for a series of decisions. Our results also highlighted the contextual complexity during these implementations since we also aimed to contribute to the scientific literature in the field of SAR implementations. Previous research was mainly focussed on the success factors of such implementations and tend to neglect the specific environment. However, our results addressed this environment and the complexity that comes with the continuous changing stakeholders, the cross-domain purpose of the tool and evolving (i.e. holding or size) dynamics to meet a company's objective. This research, therefore, provides organizations a solid basis for better decision making and potential improvement during SAR implementations.

Contents

1. Introduction

A well-known phenomenon in many organizations for decades and even longer in biology is the impact of change on each other. Take for example the cheetah who has started to run faster to catch the fast gazelle and the gazelle who has started to run faster to avoid the cheetah. Both species are demonstrably faster than their fossil ancestors. They cannot be faster than they are now but apparently, they have reached a balance where both species can survive. This series of mutual pressure makes them evolve together and as one evolves it forces the other one to evolve. This extraordinary biological evolution triggered us to delve into the scientific organizational alignment evolution articles. Do we see the same pattern and how does this evolution process evolve when it comes to stakeholder alignment? Which interactions take place during which processes to reach a balance?

Isern and Pung (2007) researched the drivers behind the fundamental change in large firms. They concluded that at some point every large firm will decide to drastically change the course of the ship. This prompted by a variety of factors such as gathering market threat or profitability. Research in 2016 (Luia, Ngaib, & Loa) described this change as a natural effect on the disruptive developments of the external market. These external factors also reflect themselves internally, where firms are not always ready for this fast change. According to Kimble & Bourdon (2013), this is mainly because multiple naturally, different domains need to co-operate together, resulting in new interactions. In this digital age, firms are required to change in an even faster and more frequent timeframe. Scholars have investigated that a firm's ability to confront information technology (IT) change is a primary determinant factor for survival (Clayton M, Suarez F, & Utterback M, 1998). This IT change plays a role in creating and maintaining a firm's competitive advantage (Christensen, Suárez, & Utterback, 1998). Firms are for this reason forced to integrate more technology to survive. This disruptive change also compels firms to develop and integrate IT strategies(Christensen et al., 1998). The study of Kimble and Bourdon (2013) shows that new features of business intelligence and analytics (BI&A) like big data and data analytics are one of the most promising disruptive technologies of this moment. Well-known companies as Amazon, Dell and eBay have shown that the way IT is used to provide more data-driven insight can be extremely powerful. However Luftman & Brier (1999) showed that applying IT in an appropriate and timely way, in harmony with business strategies, goals, and needs, Business-IT alignment (BITA), has been a major challenge for decades within firms.

Reviewing the alignment literature and frameworks it highlights that for decades researchers have argued the importance of business-IT alignment, resulting in several BITA models (Luftman & Brier, 1999). The different models focus on different components and perspectives. According to El-Mekawy, Rusu, and Perjons (2015), this makes it difficult to select a fitting model for a specific industry or organization. Next to that the complexity of organizations is increasing, challenging the traditional BITA models (Zhang, Chen, Lyytinen, & Li, 2019). According to Merali and Onix, the complexity theory and related complex adaptive systems (CAS) principles better address today's environment complexity and the organizational challenges since they often provided potential solutions (Merali, Papadopoulos, & Nadkarni, 2012; Onik, Fielt, & Gable, 2017).

It becomes clear that BITA is shifting away from a sustainable and traditional model (Zhang et al., 2019). Partly because most BITA models do not focus on all stakeholder groups in both the strategic and operational settings. Because of this the complexity- and CAS principles were more often used by scholars as a basis for better suiting BITA theories (Merali et al., 2012; Onik et al., 2017). This evolved into the CAS-based concept of co-evolutionary IS/IT- alignment so Walraven et al. (2018) also emphasize in their research. Co-evolutionary information systems alignment (COISA) focuses on the operational and strategic contexts of alignment between multiple stakeholder groups. ''*COISA takes a complex adaptive systems perspective on organizations, viewing alignment as an emergent*

phenomenon of continuous interactions between individual actors within and between operational and strategic alignment processes" Walraven et al. (2018, p. 2). It acknowledges not only the different operational and strategic alignment perspectives but also defines alignment as a continuous two-way interaction between multiple internal and external stakeholders, this is according to Hickman (2016) important in this rapidly changing and complex environment.

1.1. Exploration of the topic

These different perspectives make the COISA model, in contrast to the models mentioned above, a more potent model in today's complex organizations. COISA highlights the two-way interactions between and within different alignment processes and stakeholders, which can be defined as a series of co-evolutionary moves that makes IS alignment over time (Walraven et al., 2018). Initiated by among others Benbya & Mckelvey (2006) and further elaborated by Walraven et al. (2018; Walraven et al., 2019). COISA has as far as our knowledge goes only been applied in empirical studies and healthcare. Walraven et al. (2018) focused their COISA study on successful Electronic Medical Records (EMR) implementations in delimited three Dutch-based hospitals (Walraven et al., 2019, p. 13). This specialism comes with several limitations who will be further addressed in this study. Walraven et al. (2019) only focussed on operational and strategic co-evolution in EMR implementations. COISA may be manifesting differently while implementing rising, disruptive data technologies as Spend Analytics and Reporting (SAR). SAR can be defined as a solution that provides organizations a wide view of spending, including cleansing, enrichment, and analytics for identifying cost-saving opportunities (Tabak, 2016). According to Pandit & Marmanis (2008, p. 15), SAR provides holistic detailed visibility into spending patterns, creating a foundation from which opportunities can be identified and actions can be taken. However, there is a relatively low success rate when it comes to the implementation of SAR (Tabak, 2016). Commodity classification, specific data enrichment and visibility within the organization are among the specific challenges for a successful SAR implementation (Tabak, 2016). Although SAR is becoming an important topic in practice, academic research is still limited (Westerski, Kanagasabai, Wong, & Chang, 2015). This also applies to the literature related to SAR implementations, however closest related to SAR is, business intelligence and analytics (BI&A), as SAR can be seen as a business intelligence application (Kamruddin, 2005; Singh, Kalagnanam, Verma, Shah, & Chalasani, 2005).

Pandit and Marmanis (2008) argue the challenges that may occur during the implementation of SAR, are those where other departments besides Procurement need to work together. This often results in complex multi-stakeholder and multi-context issues related to business processes, data ownership, and quality. Tabak (2016) researched the success factors behind SAR which he distinguishes between the organizational factors (management support, user participation, trust, clear vision/objective, change management) and technical factors (data quality, technical capabilities, scalability/flexibility). However, no specific attention nor academic research thus far is conducted on the co-evolution process during SAR implementations.

Previous alignment research has mainly been focussed on exploring the various factors and mechanisms of co-evolution driven by environmental dynamics and organizational complexity (Zhang et al., 2019). The COISA model by Walraven et al (2019) distinguishes itself by acknowledging the existence of different alignment perceptions inside an organization. Resulting in sometimes aligned but contradictory scenarios on different levels (Walraven et al., 2018). This in contrast to for example El Sawy (2013) who displays a configurational model to explain the complexity within organizations from only one strategic perspective divided over four themes. Or the three-level co-evolutionary model by Benbya & McKelvey (2006) that focuses on the strategic, operational and individual level (Kautz, 2012). Therefore, a gap exists in the current literature in the field of SAR implementation and co-evolution. A

clear need for further research into these manifestations is visible due to the recent rise of COISA and required in-depth research to validate and compare the COISA finding of Walraven et al. (2019) in SAR implementations.

1.2.   Research objective, motivation, and questions

The objective of this study is to create a further in-depth understanding of COISA and the different dynamics that consists in SAR implementations. The demonstrated lack of co-evolution insight during SAR implementations provides an opportunity for recommended future research. Next, to that, we aim to build on and decrease by Walraven et al. (2019) identified gap and manifestation differences in other than EMR implementations and in terms of COISA. Our research question is therefore as follows:

How does co-evolutionary IS-alignment manifest in SAR implementation?

This research aims to validate, compare and understand how Co-evolutionary Information Systems alignment manifests and differs in SAR implementation. In this way, we aim to contribute to the scientific literature in the field of SAR implementation and co-evolution during alignment processes. Next, to that, we aim to provide an empirical basis understanding for COISA operationalization in the context of SAR implementation. The output and insight of the research may potentially improve the decision making in companies during SAR implementations. This research will be carried out in a systemic way starting with a theoretical framework and research methodology. Hereafter the results and discussion will follow.

2. Theoretical framework

2.1. Research approach

To answer the research question we firstly focused on the most suiting research approach. Since we do not test hypotheses but narrow our focus on the research question this research is according to Saunders (2009) considered inductive. In this, we aim to better understand reality based on the observations in practice and develop explanation theories for patterns in the data. However, according to Denzin and Lincoln, an inductive approach comes with the limitation that it does not directly produce generalized theories and conclusions (2008).

For the theoretical foundation of our research, we evaluated several conceptual models as also mentioned in the introduction. Not all models suit our aim and the holistic perspective we are focussing on in this study. The biggest shortcoming we encountered in these other studies is that the co-evolution was focused on a specific context of alignment i.e. operational or with a limited stakeholder view (Hickman, 2016). This does not completely fit the complex multi-stakeholder and multi-context setting in which SAR implementations operate (Pandit & Marmanis, 2008). COISA outlines this complexity better as is also addressed in the identified articles:

Walraven, van de Wetering, Helms, Versendaal, and Caniëls (2018)

Walraven, van de Wetering, Versendaal, and Caniëls (2019)

These articles ultimately formed the starting point for our further search. We used the backward snowballing method first to fully understand the COISA model as conceptualization in this current study (Thornhill et al., 2009). We started with the article by Walraven et al. (2018) and went through the titles of the reference list to include or exclude papers from entering the snowballing procedure. We selected papers based on their link to co-evolution in the context of information systems and the scientific correlation to each other meaning, the articles complement each other scientifically in some way or at least do not contradict each other. We ended up with the following papers based on the abstract and secondly on the full reference:

Luftman, J., Papp, R. & Brier, T. (1999).

Benbya, H., & McKelvey, B. (2006).

Amarilli, F., Van Vliet, M., & Van den Hooff, B. (2017).

The papers focused on the enablers and mechanisms but none of them specifically on complex co-evolution in alignment processes. Based on the direct link to co-evolutionary IS alignment we decided to not include any other papers because they were often only partly linked to the gap we are investigating. For the forward snowboarding, we only came across Walraven et al. article of 2019 to include. This because of the relationship to Walraven et al. (2018) earlier work, it is the only paper that adds direct further research to co-evolutionary IS alignment.

During the search, we mainly used Google Scholar because our keywords were specific authors and titles whom we could find here the fastest. The low outcomes of the snowballing method forced us towards the building block method (Thornhill et al., 2009). Within this method, the elements of the research question figured as keywords during the search. This resulted in the building blocks shown in table 2.1:

RQ: *How does <u>co-evolutionary</u> <u>IS-alignment</u> manifest in <u>SAR</u> <u>implementation</u>?*

Table 2.1 Building blocks

Co-evolutionary	AND ⬚	IS- alignment	AND ⬚	SAR implementation
#Organizational evolution		#IT-alignment		#Spend Analyses
#Complex adaptive systems	OR	#Multiple stakeholders	OR	#Business Intelligence and Analytics (BI&A)
#Continuous change		#Stakeholder interaction		#Spend Tool

We used the bibiliotheek.ou.nl search base for complex queries and the Google Scholar search base for simpler queries. We selected the articles for our theoretical cadres based on several criteria. First of all the paper had to be relevant by fitting the scope of our research and linked to one of the keywords. For the screening we, therefore, used some practical criteria:

The abstract explicitly mentions one of the keywords as a focus topic, assuming that the abstract highlights the focus of an article
The abstract mentions the co-evolution
The abstract mentions an information technology implementation setting

Secondly, we only selected the articles published in the last two decades to follow the evolution and keep it up to date. We also checked if the article was cited at least 50 times, assuming that the number of cites tells something about the reliability since it is explicitly referred to in other articles (Thornhill et al., 2009). We also checked if the author published more articles about this scientific field considering there is knowledge of the matter (Thornhill et al., 2009).

2.2. Implementation

This approach resulted in several articles per keyword. In our first search, we found about 25 on the first sight relevant articles, however, going deeper we eliminated the ones that were just partly in the scope of research. We ended up with 18 relevant articles that we wanted to include in our research and analyzed. Please find below table 2.2 with an overview of the included articles per keyword.

Table 2.2 Scientific result per keyword

Co-evolutionary	IS-alignment	SAR implementation
Isern, J., & Pung, C. (2007). Driving radical change. McKinsey Quarterly.	El-Mekawy, M., Rusu, L., & Perjons, E. (2015). An evaluation framework for comparing business-IT alignment models: A tool for supporting collaborative learning in organizations.	Westerski, A., Kanagasabai, R., Wong, J., & Chang, H. (2015). Prediction of enterprise purchases using markov models in procurement analytics applications.
Zhang, M., Chen, H., Lyytinen, K., & Li, X. (2019). A Co-evolutionary Perspective on Business and IT Alignment.	Coltman, T., Tallon, P., Sharma, R., & Queiroz, M. (2015). Strategic IT alignment: twenty-five years on.	Vosloo, P., & Naidoo, R. (2019). Contextual critical success factors for the implementation of business intelligence & analytics: A qualitative case study.

Walraven, P., van de Wetering, R., Versendaal, J., & Caniëls, M. (2019). Using a co-evolutionary IS-alignment approach to understand EMR implementations.	Luftman, J., & Brier, T. (1999). Achieving and sustaining business-IT alignment.	Singh, M., Kalagnanam, J. R., Verma, S., Shah, A. J., & Chalasani, S. K. (2005). Automated cleansing for spend analytics. Paper presented at the Proceedings of the 14th ACM international
Benbya, H., & McKelvey, B. (2006). Toward a complexity theory of information systems development. Information Technology & People, 19(1), 12-34.	Ryan, T. K. (2010). Business-IT alignment maturity: The correlation of performance indicators and alignment maturity within the commercial airline industry.	Tabak, R. (2016). Critical success factors for spend analytics.
		Pandit, K., & Marmanis, H. (2008). Spend analysis: The window into strategic sourcing.
		Kamruddin, F. (2005). Spend analysis and strategic sourcing: A critical component of merger & acquisition synergies. Procurement Insight, 4(3), p1-3
	Walraven, P., van de Wetering, R., Helms, R., Versendaal, J., & Caniëls, M. (2018). Co-evolutionary IS-Alignment: A Complex Adaptive Systems Perspective.	Villamarín, J. M., & Diaz Pinzon, B. (2017). Key success factors to business intelligence solution implementation. Journal of Intelligence Studies in Business, 7(1), 48-69.
	Amarilli, F., Van Vliet, M., & Van den Hooff, B. (2017). An explanatory study on the co-evolutionary mechanisms of business-IT alignment.	Jamaludin, I. A., & Mansor, Z. (2011). The Review of Business Intelligence (BI) Success Determinants in Project Implementation. International Journal of Computer Applications, 33(8), 24-27.

2.3.   Results and conclusions

Reviewing the literature has led to the outcome of using Walraven et al. (2018) COISA model as a theoretical framework to research the occurrence of co-evolution in complex SAR implementation processes. This because COISA focusses on operational, strategic and multi-stakeholder alignment, a well-known importance since the late 1970s (Luftman & Brier, 1999; McLean & Soden, 1977; Parker, Benson, & Trainor, 1988). According to Coltman, Tallon, Sharma, and Queiroz (2015) alignment remains important in today's firms. Especially the alignment between information technology and business (Luftman & Brier, 1999).

As mentioned in the introduction the traditional BITA models are being questioned because of their limited perceptions and the changing complexity of organizations (Zhang et al., 2019). Other models that do focus on this co-evolutionary IS- alignment is Benbya and Mckelvey's (2006) top-down and bottom-up design which assesses the changing requirements in the operation. Amarilli et al. (2017) co-evolutionary mechanisms of the business-IT alignment model specifically focus on the factors and mechanisms within the alignment process. However both models, in contrast to the COISA model, do not address the business processes where this evolution manifests. This is particularly interesting for the research because the complexity of SAR implementations is highlighted during these processes

(Tabak, 2016). The COISA model already identified them, making it a useful starting point. Therefore COISA's conceptual and holistic model will be used for the research.

Scientific articles about SAR implantations were hard to find since the academic research on this topic has mainly been conducted on specific scenarios such as risk management, fraud detection and analytical techniques (Pandit & Marmanis, 2008; Tabak, 2016). However, we used articles closest related to SAR which is BI&A (Kamruddin, 2005; Singh, Kalagnanam, Verma, Shah, & Chalasani, 2005). Looking at other studies about BI&A it implies that BI&A implementations have a unique set of characteristics as mentioned in the introduction (Pandit & Marmanis, 2008; Tabak, 2016). Most academic research has been done on the success factors of BI&A and also resulted in a variety of models that define these success phenomena (Jamaludin & Mansor, 2011; Villamarín & Diaz Pinzon, 2017; Vosloo & Naidoo, 2019). Take, for example, the study of Vosloo and Naidoo (2019) which stated that most BI implementation studies tend to neglect the contextual challenges of such an implementation and overemphasize the success factors without paying enough attention to the complex and multi-layered context. This statement is also supported by another study of Jamaludin and Mansor (2011) which underlines the technical, operational and strategic factors of successful BI implementations and implies that "*companies treat BI projects as just another IT project. BI is neither a product nor a system. It is, rather, a constantly evolving strategy, vision and architecture that continuously seeks to align an organization's operations and direction with its strategic business goals*" (Jamaludin & Mansor, 2011, p. 24). Another study of Villamarín and Diaz Pinzon (2017) highlights the continuous developing and adapting challenges facing an organization in these implementations, all while aligning with its strategy and environment. Successful implementation, therefore, requires a cross-organizational collaborative culture with highly skilled stakeholders and a specific focus on communication and management support to increase the likelihood that a BI project will finish on time, on budget and with the right functionality. The gap between BI success factors and context in which these implementations take place requires a holistic and pluralistic approach and framework highlighting the complexity in which these implementations take place.

COISA specifically suits this need since it assesses the two-way interactions within and between five alignment processes namely, strategy formulation, strategy implementation, enterprise architecture management, IT implementation and IT usage (Walraven et al., 2018). The model, shown in figure 2.1 provides an operationalization for measurement in complex scenarios. Next, to that, the model incorporates different stakeholder groups with not just IT- and business actors but also external actors in the alignment process (Walraven et al., 2019).
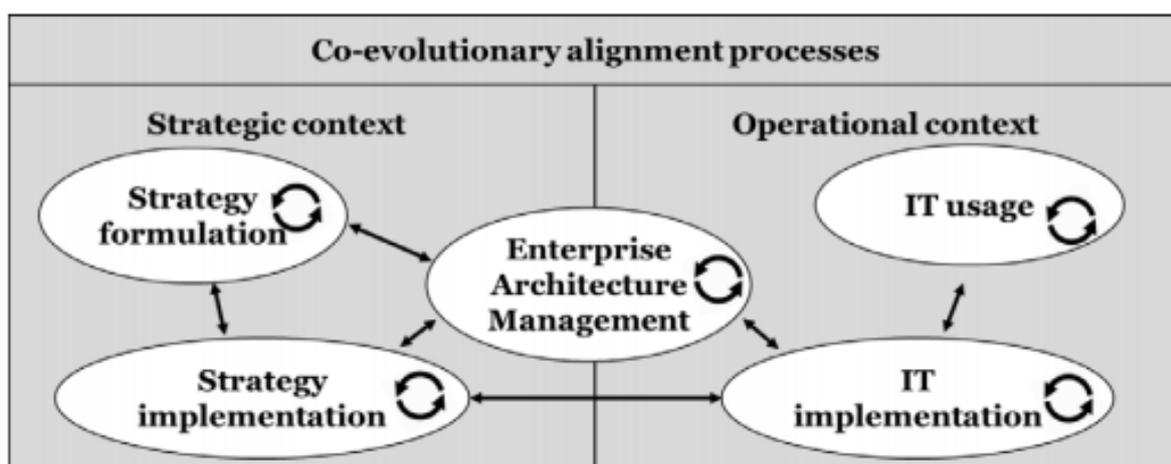

Figure 2.1 COISA model by Walraven et al. (2018)

Since we used Walraven et al. (2019, p. 5) as a starting point and wanted to maintain consistency the same definitions as in their research are used for further analyses and measurement. The definitions can be found in table 2.3.

Table 2.3 Definitions COISA (Walraven et al., 2019)

Alignment process	Working definition
Strategy formulation	*The process of defining strategic objectives that the organization wants to achieve* (Walraven et al., 2019, p. 5)
Strategy implementation	*The process of setting up and maintaining structures to ensure that strategic objectives are realized in the operational context of the organization* (Walraven et al., 2019, p. 5)
Enterprise architecture	*The process of managing an organization's architecture* (Walraven et al., 2019, p. 5)
IT implementation	*The process of embedding an IT solution within an organization* (Walraven et al., 2019, p. 5)
IT usage	*The process of employing a system to perform a task* (Walraven et al., 2019, p. 5)

During the research, we continue to build on alignment, applying IT in an appropriate and timely way, in harmony with business strategies, goals, and needs (Luftman & Brier, 1999), and investigate the specific co-evolution in interactions, which includes the two-way communication between stakeholders (Kautz, 2012; Shao, 2019, p. 2), during these alignment processes.

To identify co-evolution taking place within or between the alignment processes we made use of the role and responsibility charting (RACI). RACI stands for Responsible (to do the job), Accountable (for the direction and authority of an activity), Consult (for expertise, suggestion or to determine final decision or action) and Inform (when the action is done). It describes the various roles per stakeholder in a project or in this case per alignment process (Susanto & Putranto, 2018). The matrix is particularly useful to structuralize our co-evolution analysis and to ensure replication of our study since it displays the interaction of the stakeholders. Co-evolution implies the two-way interaction as a series of moves that make alignment over time (Amarilli, Van Vliet, & Van den Hooff, 2017; Benbya & McKelvey, 2006; Walraven et al., 2018), in this case, we consider co-evolution to take place when in an alignment process, the involved stakeholders interact with each other with different RACI roles to arrive at a series of decisions and moves. The RACI is, therefore, a commonly used model in studies to analyze alignment and interaction in multi-stakeholder IT projects (Khan & Quraishi, 2014; Smith, Erwin, & Diaferio, 2005; Susanto & Putranto, 2018).

The interactions concern the stakeholders that are involved in SAR implementation (Tabak, 2016). The stakeholders in this process may according to Pandit and Marmanis (2008) differ from procurement, business and IT. The COISA model does not specifically focus on Procurement as a stakeholder group but instead on all internal and external stakeholder groups (Walraven et al., 2019). To make the COISA model more suitable for the context of SAR implementation, the actor of external stakeholders will be the consultancy agency (Pandit & Marmanis, 2008). The business, consisting of Procurement and Finance, and IT stakeholders remain the same added by the Information Management Organization (IMO).

2.4.   The objective of the follow-up research

The objective of this research is to assess and better understand the COISA model manifestation in SAR implementations. SAR implementations come with different challenges and complex dynamics who are similar to those in BI&A implementations which results in a multi-content and multi-stakeholder implementations environment (Tabak, 2016). A multiple case study showed that although the fact that corporations are beginning to experience success with implementing IT solutions they cannot promise a successful implementation and execution (Iskandar, Akma, & Salleh, 2010). This because most BI implementation studies are mainly focussed on the success factors and tend to neglect the contextual complexity within these implementations (Villamarín & Diaz Pinzon, 2017; Vosloo & Naidoo, 2019). Firms must better understand the complex playing field and engage with different stakeholders (Iskandar et al., 2010, p. 312). As far as our knowledge goes COISA has in the past only been used to investigate this complexity in EMR implementation but not in SAR or BI&A implementations. With this research, we, therefore, aim to provide a deeper insight into the current co-evolution within SAR implementations and propose a solid basis for potential future research.

3. Methodology

3.1. Research model

To research the COISA manifestation in SAR implementation a single case study approach has been selected. This because according to Thornhill et al. (2009, p. 186) a case study provides an in-depth opportunity to observe and analyze a phenomenon, in this case, the COISA manifestation. This generally results in qualitative methods of data collection (Thornhill et al., 2009, p. 147). A single case study approach has been selected because of the nature of our research. We are explicitly focussing on SAR implementation in a setting whereby Pandit & Marmanis (2008) defined stakeholders, Business (Finance and Procurement) and IT, together with external stakeholders and IMO are working together. A multiple case study approach generally produces more evidence and allows replication (Thornhill et al., 2009, p. 187). However, the aim of the research is not to achieve literal replication but to understand how COISA manifests and differs in SAR implementation.

3.2. Technical design

This study will be carried out within an airline and will focus on the implementation of a SAR tool in a long-existing, internationally merged firm. The ambitions of this firm are to implement and execute a data-driven strategy to reach its objective. This reflects itself in making fewer decisions based on feeling but more on actual data. This ambition also applies to make better purchasing decisions. This starts with access to historical purchase data. After numerous partly successful attempts the firm decided to invest heavily in a spend analytics tool. With multiple stakeholders and a haunting past, the firm is facing a rather tough challenge.

To gather all the required data semi-structured interviews were held with the different stakeholders per alignment process (Walraven et al., 2019). We decided to go for semi-structured interviews because of the purpose of our research. The research is exploratory since we are trying to better understand the COISA manifestation (Thornhill et al., 2009, p. 394). Here interpretative information from the organization is needed about in this case, the specific alignment processes. Semi-structured interviews consist of fixed questions per alignment process and questions depending on the conversations (Thornhill et al., 2009, p. 391). This approach provided us to probe answers when more explanation was required. The data was captured via audio-recording and fully written out (transcribed) to assure that no data got lost (Thornhill et al., 2009, p. 391). Table 3.1 below provides an overview of the used data collection method per process and stakeholder group. The stakeholders were selected based on the RACI chart (Smith, Erwin, & Diaferio, 2005; Turner, 2016, p. 42). The chart provides a clear division of responsibilities and is also used within the organization of our case. Only the stakeholders labeled as accountable, known as approver have been interviewed because they are primarily the ones with the best overview, maintaining communication with the other stakeholders (Smith et al., 2005). Besides, there is only one accountability role per alignment process which was advantageous for the stakeholder selection (Smith et al., 2005). Based on this set-up the stakeholder groups can be labeled per alignment process as fully involved (responsible or accountable), partly involved (consult) or not involved (inform).

Table 3.1 Data collection overview

Alignment process	Data collection	Stakeholder group
Strategy formulation	Semi-structured interview	*Finance*
Strategy implementation	Semi-structured interview	*Consultant*
Enterprise architecture	Semi-structured interview	*IT*
IT implementation	Semi-structured interview	*IMO*
IT usage	Semi-structured interview	*Procurement*

3.3.   Data analysis

The output of the retrospective interviews was not only audio-taped and transcribed but also fully analyzed. Our research is according to Yin (2003) a descriptive case that is used to describe a phenomenon in the real-life context in which it occurs, also called interpretive research. To quickly access the relevant data, a descriptive and pre-defined deductive data coding technique has been used. The interviews consisted of mostly fixed questions, according to Saldaña (2015) the pre-defined coding method initially categorizes the data on commonalities, differences, and relationships. Our coding method was done in a three-step way to analyze our qualitative data in a structured way and increase the chance of repeating it. The first step started while setting up the research questions, which can be found in Appendix I, every question was related to our conceptual COISA model and linked to our research question to determine the frequency of themes (Saldaña, 2015). Example: how does COISA manifest in SAR implementation? Pre-defined code: STRATEGY FORMULATION, STRATEGY IMPLEMENTATION, ENTERPRISE ARCHITECTURE, IT IMPLEMENTATION AND IT USAGE. In the second step, we coded the transcripts per alignment process in passages indicating the RACI roles since this tells us something about the one-way or two-way stakeholder interaction and co-evolution. Example: stakeholder A was informed about the selected SAR tool during the enterprise architecture process. This phrase indicates that stakeholder A had an inform role which also illustrates a one-way relationship with the other stakeholders resulting in the code: INFORM. In the last step, we coded text passages that summarized the primary experience of the stakeholder during an alignment process enabling us to relate to success indicators of previous studies. Example: stakeholder A looked back with a good feeling because the other stakeholders valued his input during the process, descriptive code: APPRECIATION. Although there are several software programs available to analyze qualitative data such as Atlas TI we decided not to use an electronic data management tool. This because the transcripts are often complex strings of words and sentences. As a researcher, we are more component to see these complexities and interpret them with our rational reasoning. A simple spreadsheet is therefore used to keep track of the codes.

3.4.   Validity, reliability and ethical aspects

To enhance the overall quality and trustworthiness of the research and analysis several basic key elements have been used. This ensures enough details for the readers to assess the validity and credibility of the output. This starts with a detailed substantiated research question, followed by appropriate study design, systematic data collection management, via five semi-structured transcribed interviews, and a clear three-step coding method and analysis as described before.

Next, to that, the collected data will be checked on validity, reliability of the person/role and actuality by speaking to multiple stakeholders (Baxter & Jack, 2008). Case studies lend themselves too many data credulity of truth-value strategies that will be used. Under reliability we understand the extent to which accidental mistakes are made; if the research was repeated, with other researchers, will this still lead to the same result? Validity is the extent to which the data collection method accurately measures what needs to be measured (Thornhill et al., 2009).

From an ethical aspect, we made sure that any form of risk or harm was minimized by keeping all the participants informed and validated their output. We also assured all the data was protected anonymously and confidential during the research and analysis (Thornhill et al., 2009).

4. Findings

We have studied the co-evolution during SAR implementations along with the five alignment processes. This with the input of the accountable stakeholders per process. Each stakeholder had a different role during the implementation and represented a different stakeholder group and their interests. The case has taken place in a large organization with 85.000 employees, the SAR tool went live in April 2019 in close cooperation with Procurement and Finance (business), IT, IMO, and a consultancy agency. The involvement role per stakeholder in each alignment process is summarized in table 4.1. In this chapter, we will further discuss the notable findings per alignment process.

Table 4.1 Stakeholder involvement per alignment process

Alignment process	Stakeholder 1 Procurement	Stakeholder 2 Finance	Stakeholder 3 Consultant	Stakeholder 4 IMO	Stakeholder 5 IT
Strategy formulation	Consult	Responsible/accountable	Inform	Consult	Inform
Strategy implementation	Responsible/accountable	Responsible/accountable	Responsible/accountable	Consult	Inform
Enterprise architecture	Consult	Consult	Consult	Consult	Responsible/accountable
IT implementation	Responsible/accountable	Responsible/accountable	Responsible/accountable	Responsible/accountable	Responsible/accountable
IT usage	Responsible/accountable	Consult	Inform	Consult	Inform

Inform role	= not involved
Consult role	= partly involved
Responsible or accountable	= fully involved

4.1 Co-evolution within strategy formulation

When we talk about strategy formulation we refer to it as, the process of defining strategic objectives the firm wants to achieve using the new SAR tool (Walraven et al., 2019, p. 5). Looking at our case we discovered little co-evolution in this process due to several indications of one-way communication for a series of moves. For example, two stakeholders appeared to have the inform role during this process wherefrom one was involved in the preliminary research. Two other stakeholders indicated to have been involved in this process, however with a consulting role and very little impact which demonstrates little two-way interaction. The Finance stakeholder have mainly laid the foundation for the developed high-level strategy and could be labeled as both accountable and responsible stakeholders maintaining a two-way interaction relationship with the consult stakeholders. Looking back the stakeholders agreed that the strategy could have been a little more profound in more consultation with among others, the software provider and IT team. Their expertise could have helped to set up the right contract and a more detailed strategy, creating a positive contribution to the next steps of the project and would have helped in the communication to the end-users. One stakeholder stated: "*Individually everybody has the right knowledge, but everything depends on good communication and good cooperation, the collaboration in the SAR project started when things went wrong*". The stakeholder refers here to the fact that the contract had to be broken open because the wrong IT solution had been contracted, also indicating a poor two-way interaction. Nevertheless, one stakeholder quoted: "*I knew that we needed this Spend Analytics and Reporting solution and that it would be exploited somewhere in a business process*". This observation was also supported by the project manager who indicated that a high-level strategy was deliberately chosen because they opted for a simple commercial package, to further develop their strategy in the future. Therefore they had to create a certain bandwidth to take into account several preconditions from a security and sanity perspective, mainly IT-driven.

4.2   Co-evolution within strategy implementation

In the case study, it became clear that the process of setting up and maintaining structures to ensure that strategic objectives were realized in the operational context was more complex than expected. The project leader emphasized that the tool selection has been the basis for the internal objectives and strategy and that has led to the start of an implementation, strategy, and communication policy to involve people. On all kinds of levels, the project team tried to involve the right people and get them together for several workshops to agree with each other and change. This resulted in much one-way and two-way communication with the users. Sometimes with success, but the users turned out to be less change-oriented than the stakeholders expected. One stakeholder stated that: "*system strategy adoption by users is IMO and Business work*" which also explains their consult, responsible and accountability roles and two-way stakeholder relation. However, one other stakeholder, who was involved in the strategy implementation process with minimal influence and inform role, described it as a game of power with many different actors in a complex organization. This complexity sometimes went beyond the primarily involved stakeholders, which made it despite the stakeholder interactions difficult for the main drivers and supporters of the project to come to a mutual series of aligned movements and decisions. These were actors such as internal resource shortages and return on investment limitations which went beyond the responsibility of the involved stakeholders. This has given some stakeholders the feeling that unconscious choices were made which they did not agree with, especially linked to the strategic objectives. All in all, there was a great number of unstructured interaction which resulted in operational decisions being made however, we could not describe it as a co-evolution process since it was not done through a series of two-way alignment interactions between the interviewed stakeholders.

4.3   Co-evolution within enterprise architecture management

The process of managing the organizational architecture was certainly affected during the implementation of SAR and showed many indications of co-evolution. The stakeholders had to make a series of decisions for the further implementation of the technical architecture, related to data flows and data storage in a cloud or self-build solution. According to the stakeholders it was not easy to make a decision, especially because it was a completely new solution from an IT perspective. Therefore the team had to be convinced about decisions, resulting in many consultation roles for expertise and suggestions to determine the final action. This also highlights the two-way interactions that took place between the stakeholders in this alignment process. The project manager indicated that this was a challenging process to manage because of many reasons, for example, not all the stakeholder had the same IT knowledge and the internal IT organization turned out to be rather complex with a substantial layering and extra elements. The IT stakeholder agreed with this statement however, he looked back on this alignment process with satisfaction and quoted: "*During the project, I experienced that the architects were listened to carefully*". The fact that there was no modular business process was experienced a loss in structure for action but nevertheless, the different stakeholders made decisions based on two-way trust and interactions, resulting in a positive change during this alignment process. One stakeholder summarized it as follows: "*This was one of the first projects where we came through the front door together with IT. We made a very conscious choice where most stakeholders have kept a good feeling about*". A co-evolution has there certainly taken place in this process since the stakeholders made many aligned decisions based on several two-way interactions.

4.4   Co-evolution within IT implementation

For embedding the SAR tool within the organization a Finance and Procurement co-ownership project team was set-up. This alignment process showed many indications for co-evolution, so has the

multidisciplinary team consisting of a business (with a primary focus on procurement) and IT track quickly been expanded into a wider population adding the Finance and the holding company. Even though the holding joint, the majority of activities stayed at the initiator as they held the accountability roles. The IT track was according to the project manager more complex since it is a fully joint department, this was challenging because many IT knowledge was in the other organization which resulted in many two-way interactions starting by the initiator. However the stakeholders did get the feeling that everyone was on board, even though the holding dynamics entailed limited involvement and an inform role, the stakeholders experienced it as sufficient to implement the tool. The whole implementation process was supported by a consultancy agency and steering committee that was responsible for directions and expertise. Multiple stakeholders emphasized the good support and commitment from the steering committee. One stakeholder quoted: "*In the beginning, it was a lot of micromanagement*" which indicates a one-way interaction. The stakeholders later connected and communicated more to understand each other's responsibilities, reaching a point where decisions were made within the teams themselves, cross-team decisions were discussed in the weekly meetings and major decisions were made in the steering committee. This all indicates a repeating structural way of two-way communication for movement within the implementation process. This freedom together with the fact that the team was physically together really gave the stakeholders a feeling of empowerment which contributed to the co-evolution in interaction. One stakeholder described it as a self-steering team with a culture were bottlenecks are being shared and discussed quickly. One other stakeholder highlighted the following: "*What I really liked was that we operated as one team. What I have seen before is that there was a business, IT team, etc. and they all worked on their own island*". During the implementation, the team also did much on communication which helped in the whole process and adoption. Looking back the project manager agreed that the whole set-up was quite complex but he would not know how they could have done it differently. The interaction and way of working to come to several decisions during the IT implementation shifted naturally to a way that worked for everyone, therefore we can certainly talk of co-evolution.

4.5 Co-evolution within IT usage

Looking at how the SAR system is employed in business processes we see different signs of progress regarding co-evolution. One stakeholder defined two extremes, the early adopters who are open for two-way communication and want to take action and the people for whom the step to a data tool is just too big. Several stakeholders highlighted the fact that some users may still view it as a tool that is not built for the joint holding company, resulting in them being less involved in the implementation and a more one-way interaction. Although the tool is not yet fully used, a transition in communication has according to the stakeholders taken place. Some Procurement and Finance domains are more successful and cooperative than at the beginning since more two-way interactions are taking place however, we see little indications of decisions being made in full alignment with them. So did one stakeholder mentions the following: *"I expected the user population to be slightly more in favor of change with a little more drive to get started with this data, but then we realized that this is a huge change process"*. Top-down support, success stories, and adoptions were mentioned by the stakeholders as key drivers to get the tool embedded. This would according to them probably require a different approach per domain with different stakeholders and roles, since it is a cross-domain solution. In the beginning, it was according to the stakeholders quite challenging to get everyone on board for the usage, however, the top-down support from Procurement was certainly present during this alignment process while other indirect stakeholders appeared to be quite skeptical. What was greatly appreciated during the implementation and in the eyes of the stakeholders helped in this progress, was the recognition that the tool received and team spirit experience. The tool was

introduced with a logo, identity, newsletter, and official go-live for the users to increase usage, after the go-live a monthly key-user group meeting has been set-up to improve the two-way communication between stakeholders and other users, also providing the users a platform to share their input on, to be made, choices and further tool development. In this process, we, therefore, can speak of a growing co-evolution since all stakeholders agreed that the end-stage concerning the usage was certainly not yet achieved, but based on the basis they have achieved now they were convinced that with more trust, two-way collaboration and more senior support the tool usage will gradually increase and result in series of aligned development moves being made together.

4.6   Co-evolution between alignment processes

Looking at the five alignment processes within COISA we found that within the SAR implementation co-evolution has mainly taken place between and within enterprise architecture management and IT implementation. This because the stakeholders experienced a big difference between the pre-study phase, (strategy formulation) to implementation (enterprise architecture and IT implementation) and delivery (IT usage and strategy implementation) which could be explained by the different RACI roles per process. During the enterprise architecture and IT implementation, we see more consult and responsibility roles, resulting in more two-way communication and continuous flow of making decisions together. Figure 4.1 presents an overview of the co-evolution within the alignment processes during the SAR implementation.
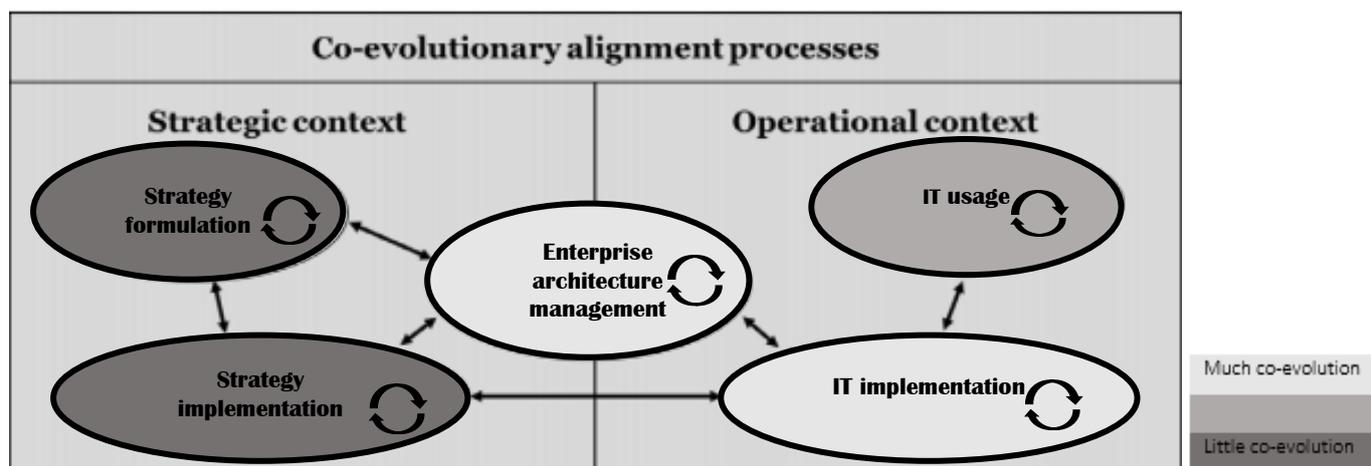

Figure 4.1 SAR co-evolution within alignment processes

The users gradually changed their attitude from one-way wait-and-see to natural/positive after the implementation while IT in the architecture phase had to be convinced resulting in many two-way consultation interactions and a series of moves being made. The stakeholders encountered that not all the stakeholders were always visible but they knew to find each other. This ensured that during the implementation and architecture phase they understood each other better. The interaction became smoother because of transparency, consistency, and trust between the stakeholders. The project manager described this progress as: "*keeping the frogs in the bucket*". All the stakeholders agreed that this was quite challenging in the beginning but by sharing the booked results, the perception of the tool adjusted naturally. Besides, the stakeholders took time and effort to meet the stakeholders face to face, resulting in better two-way communication. This contributed enormously to getting the project into a calm place where everybody was with peace not always getting it their way, showing many indications of co-evolution. In this way, the team grew closer to each other between the architecture and implementation phases. A "can do" mentality emerged and the team was not only fully committed but was also really willing to do more and go the extra mile.

The stakeholders noticed that a few elements were experienced as downsides, making the implementation and co-evolution complex. First of all the complexity associated with the size of the organization and cross-domain purpose of the tool, suppressed by the holding dynamics. Also, the stakeholders experienced cooperation with the software provider really as a client–customer relationship. One stakeholder described it as an impersonal stakeholder who could have put a little more effort to be part of the team. Also, the operational control role from the IMO side was less fluid than expected by some stakeholders.

The stakeholders were aware that the tool was not fully embedded yet and that strategy success is needed to get the tool to a higher level. However, the stakeholders all looked back at a successful implementation specifically if they compared it to other implementation projects within the organization. As a team, they delivered a tool on time and within budget, mainly because of the teamwork, commitment, and willingness of the stakeholders during the process. Multiple stakeholders explicitly mentioned the connecting role the Chief Procurement Officer brought in. According to him, the following balance needs to be achieved during implementations: "*You have to keep the stamina and optimism of running a marathon and the boost and energy of a sprint*".

5. Discussion, conclusion, and limitation

This study shows a further developed in-depth understanding of how COISA manifests in SAR implementation and the contextual complexity that comes with this. We aimed to build on and decrease the by Walraven et al. (2019) identified gap of COISA in other than EMR implementations and next to that provide more insight in the environment in which SAR implementations take place (Villamarín & Diaz Pinzon, 2017; Vosloo & Naidoo, 2019). Our results show that the COISA model has once again proven to be a suitable model to in this case demonstrate, visualize and explain the complex context and alignment interaction during SAR implementations in an operational and strategic setting. The results we found showed some differences compared to the COISA manifestation in EMR implementations. For example, in our case there appeared to be no co-evolution within all five alignment processes. Within strategy formulation and strategy implementation, we found little to no co-evolution, a growing co-evolution within IT usage and the most co-evolution within the enterprise architecture management and IT implementation.

Notable within this process and probably an explanation of the co-evolution findings is the fact that within our case the pre-study of the implementation process was experienced as difficult since every stakeholder had another field of knowledge and role. It, therefore, took some time for the team to connect, communicate and trust each other's experience, resulting in the development of more two-way interactions for a series of moves, indicating a higher degree of co-evolution during the actual implementation. The strategy implementation and IT usage process show fewer indications for co-evolution since this was mainly dependent on other stakeholders who were not involved in the implementation with a responsibility or accountability role and therefore not interviewed. This highlights not only the complexity within SAR implementation that sometimes went beyond the primarily involved stakeholders, but also corresponds with the statement of Jamaludin and Mansor (2011) which argues that SAR implementations should not be viewed as a project but rather a constantly evolving process since different stakeholders continuously need to align with each other to meet the business objectives. Previous studies on SAR or BI&A implementations mainly focused on identifying the success factors of implementations, such as management support, trust, and communication (Tabak, 2016; Villamarín & Diaz Pinzon, 2017). These success factors are consistent with our results however, unlike the other studies, our research also illustrates the complex context in which these implementations take place. Our results show that the contextual context is characterized by alternating much and little co-evolution, complex holding, and stakeholder dynamics. This is partly because SAR is a cross-domain tool resulting in many involved stakeholders with different knowledge and roles. This does not always result in smooth running two-way communications for a series of choices and steps. To achieve this continuous flow, the success factors were prominently named several times however, this study does not investigate the relationship between COISA and success factors. Further research is required to understand the relationship and implications of these results.

Next to that our research method consisted of a holistic framework and a three-step coding approach which helped us to reach our aim and structurally analyze our data. However, this approach came with several limitations that should also be addressed by further research. The first limitation of this study is focussed on the stakeholders, in our study we only interviewed the direct involved and accountable stakeholders during the implementation. To have a better and complete insight of COISA during SAR implementations further investigation of more stakeholder i.e. the software provider and users would be recommended. Next to that our research is a single case study only focussed on SAR implementation and compared to the COISA manifestation within EMR implementations. A multiple case study research within SAR implementations or other IS implementations could provide more evidence on our findings. Another limitation of our study is the fact that we only collect data via retrospective interviews, making

it also slightly difficult for some key statistics like the RACI roles and interactions to be measured as we rely on the accuracy of the interviewees. Future research with a more expended variety of data collection methods could provide a better understanding of our results.

This study not only provides a better and further developed insight in SAR implementations and COISA manifestation but also contributes to the literature by clearly illustrating how the COISA model can meet the demand of a holistic and pluralistic framework to fill the gap between success factors of SAR implementations and the context in which it takes place. It validates the COISA model as a suitable framework for complex, multi-content and multi-stakeholder settings. Next to that our output provides new insights and an empirical understanding for COISA operationalization in organizations who are or aiming to implement an SAR tool or other in interest increasing BI&A tools. Our study highlights the contextual challenges and success enablers for better decision making during these implementations where companies can respond on.

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Appendix

Appendix I: Interview Guide Questions

Please find below the questions of the interview. The output of the interviews will be used to eventually answer the following question:

'' How does co-evolutionary IS-alignment manifest during SAR implementations? ''

1. What is your role in the company?

2. Why were you involved in the SAR project and what was your role?

3. What was the reason for the SAR project?

4. What was the purpose of the SAR project?

5. Could you tell me more about the project organization and its set-up?

6. How would you describe the interaction between the stakeholders during the project?

7. How was the IT architecture affected during the project, which stakeholder was involved and how did they view the project?

8. Were you involved in defining the strategic objectives of the system? If yes, what was your role and which other stakeholders were involved?

9. Were you involved in setting up and maintaining structures to ensure the objectives were met in the operational context? If yes, what was your role and which other stakeholders were involved?

10. How did the different user groups think about the project?

11. How did the managers think about the project?

12. How did the technicians think about the project?

13. Did all these stakeholders have a role in the project? If yes, how?

14. Were there other relevant stakeholders involved in the project we did not mention? If yes, who and how did they view the project?

15. Did the perception and expectations of stakeholders during the project change? If yes, why?

16. Would you describe the project as successful? Why yes/no? What were the determining factors in this?

17. What are the things you noticed during the project?