MASTER'S THESIS

Enterprise Architecture within the Manufacturing Industry

Theunissen, C.

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Enterprise Architecture within the Manufacturing Industry

A case study on the usability of an existing adoption approach
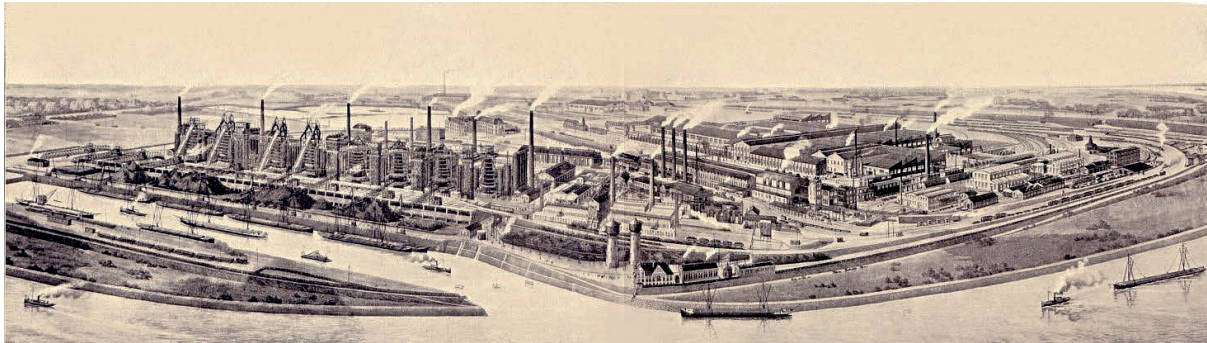
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Abstract

The success of companies in the manufacturing industry depends partly on sustainable performance and flexible response to market developments. This requires that an organisation continuously adjusts its strategy, processes, competencies, and IT systems. The manufacturing industry is currently undergoing a transition towards Industry 4.0. This transition is extra challenging because the organisational structure and reporting processes are, in many cases, based on legacy systems. As a result, innovations, business changes, and flexibility to maintain or strengthen the market position can stagnate. Enterprise Architecture (EA) is used for more structure and better overview, and manageability. Implementing EA can cause resistance in terms of adoption in the organisation. When these resistances are overcome, and enterprise-level goals are achieved, EA can act as a catalyst in the transition to Industry 4.0. This study examines the factors that influence EA adoption within the MI and focuses mainly on the aspects related to organisational change. An inductive research approach is used as a basis, combined with a deductive approach using propositions from the existing theory of Syynimaa (2015). Syynimaa (2015) designed the 'Resistance in EA Adoption Process' model and 'EA Adoption Method' to understand and steer the resistance of EA adoption. His study took place in the domains of higher education in Finland.

Key terms

Enterprise Architecture, Adoption, Change Resistance, Manufacturing Industry, REAP model.

Summary

The success of companies in the Manufacturing Industry (MI) depends partly on sustainable performance and flexible response to market developments. Therefore, companies must constantly change their business model to adapt to the changing market. This requires that an organisation continuously adjusts its strategy, processes, competencies, and IT systems. To react adequately to changes in the market, a company needs transparent information, such as production planning, customer orders, products shipped, finished products, inventories, raw materials, work in progress, invoices sent, payments received, and so on. This is often a difficult task for companies in the MI, as the organisational structure and reporting processes are often based on legacy systems. As a result, planning and managing transformations can be a daunting task, as complexity has increased over the years (Niemi & Pekkola, 2019). A consequence is that innovation, business changes and the flexibility to maintain or strengthen the market position stagnate. Implementing Enterprise Architecture (EA) provides the business with a consistent set of principles and models that guide the design and implementation of an organisation's business processes, organisational structure, information provision and technical infrastructure technologies (Boh & Yellin, 2006). The MI is currently undergoing a transition to Industry 4.0, which brings additional challenges. EA is the instrument that leads the organisation from its current state to its desired future state. To harness the benefits of EA, it is essential that EA is adopted throughout the organisation.

Understanding which factors influence the adoption of EA (EEA) within the MI requires answering the main research question:

> Which factors related to adopting EA are important when introducing it in the MI?

The theoretical framework is based on existing theories that focus on what EA is, EA benefits and EAA within the MI. Based on the theoretical framework, the empirical research was conducted in the form of a case study at the case organisation operating in the MI.

This study aims to determine the factors of resistance adopting EA within the MI. Syynimaa (2015) has designed models 'Resistance in EA Adoption Process' (REAP) and 'EA Adoption Method' (EAAM) to understand and steer the resistance of EAA. The units of measurement are derived from the REAP model and integrated into the research setup. Syynimaa's study took place in the domain of higher education in Finland.

For the data collection, first, a stakeholder analysis was carried out, and after that, a closed questionary and semi-structured interviews were conducted with the help of the selected stakeholders. The semi-structured interviews were recorded and afterwards transcribed with the use of Amberscript[1] to text documents. These transcriptions were then analysed using the ATLAS.ti[2] tool, qualitatively and quantitatively, by coding quotations in the transcribed files.

The overall conclusion of this case study is, even though Syynimaa's study took place in another domain (Higher Education in Finland), the results of this study show that the REAP model is also applicable in the domain of the MI for identifying factors of resistance in adopting EA. When these factors are identified, Syynimaa's EA Adoption Method (EAAM) can be applied to overcome the factors of resistance and helps senior management to get the required mandate. When EA has reached maturity, EA can act as a catalyst in the transition to Industry 4.0. This proposition is supported by the theories of Boh and Yellin (2006) that EA can be the essential instrument to keep changes manageable and maintainable and by the theory of Ahlemann, Stettiner, Messerschmidt, and Legner (2012) that EA ensures that business changes can be implemented quickly and easily.

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[1] https://www.amberscript.com/

[2] https://www.atlasti.com

Syynimaa's study concludes that most EAA problems are caused by misunderstood EA concepts, resistance to change and a lack of the necessary skills. These problems were also found in this study and support his theory.

As this study builds on Syynimaa (2015) REAP model, there is a chance that other perspectives on EA adoption have not been considered. Therefore, this study does not claim to be complete in terms of EA adoption factors. Due to time limitations, EAAM of Syynimaa (2015) was left out of the scope of this study.

Glossary

Term or concept	Definition or Explanation	Source
Ability to change	The ability to change is determined as an ability to conduct transition(s) between baseline and target architecture. According to TOGAF, there are several factors to be measured to assess readiness: • Vision, • Desire, willingness, and resolve, • Need, • Business Case, • Funding, • Sponsorship and leadership, • Governance, • Accountability, • Workable approach and execution model, • IT capacity to execute, • Enterprise capacity to execute, • Enterprise ability to implement and operate.	(Syynimaa, 2015)
AS-IS and TO-BE state	AS-IS: This is the current state of the organization. TO-BE: This is the situation the organization wants to achieve in the future.	
Business units	A business unit is an organizational structure, such as a department or team that generates revenue. In the case organisation, the business units are responsible for a sub-process that contributes to the end product.	
Digital innovation	Digital transformation is the radical organizational change resulting from the emergence of digital innovations such as artificial intelligence, robotics, digital platforms, innovation ecosystems, blockchain, virtual reality and the internet of things.	vu.nl
Enterprise Architecture (EA)	Enterprise architecture (EA) is a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analysing the execution of change toward desired business vision and outcomes. EA delivers value by presenting business and IT leaders with signature-ready recommendations for adjusting policies and projects to achieve targeted business outcomes that capitalize on relevant business disruptions.	Gartner
EA Adoption (EA)	EAA can be defined as 'the action or fact of adopting or being adopted' where adopt refers to 'choose to take up or follow (an idea, method, or course of action)'.	Oxford dictionaries
EA Adoption Method (EAAM)	EAAM helps in acquiring the mandate for EA Adoption from top management. It also supports individual and organizational learning and increases the likelihood of success in EA Adoption.	(Syynimaa, 2015)

EA Benefits	• EA benefits are intangible, and the value is achieved indirectly within the company's ability to change.	(Shanks, Gloet, Asadi Someh, Frampton, & Tamm, 2018)
	• EA reduce IT costs, more effective use of resources, improve agility and innovation, reduce complexity, and improve business and IT alignment.	(Boucharas, van Steenbergen, Jansen, & Brinkkemper, 2010; Foorthuis, van Steenbergen, Brinkkemper, & Bruls, 2016; Foorthuis et al., 2010; Tamm, Seddon, Shanks, & Reynolds, 2011; Wan, Luo, & Luo, 2013)
	• EA is an instrument for standardizing and integrating business processes to achieve enterprise-level goals.	(Boh & Yellin, 2006)
Global Information Systems	GIS is the overall automation department for all subsidiaries of the mother company of the case organisation.	
Industry 4.0	Industry 4.0 is a German government-sponsored vision for advanced manufacturing. However, the scope of coverage and increasing awareness in other regions spurs confusion.	Gartner
Manufacturing industry	Manufacturers often have plants, mills or factories that produce goods for public consumption. Machines and equipment are typically used in the process of manufacturing, although in some cases, goods can be manufactured by hand.	
Organizational structure	The organizational structure needs to ensure that responsibility is given to the right people without causing information bottlenecks, duplicating efforts, or wasting resources.	bizfluent.com
Resistance in EA Adoption Process (REAP)	The REAP model introduces relationships between the strategic level of EA and desired organizational changes. It captures the influence of the desired changes to the resistance and to resulting changes and is formed to explain how the strategic level of EA affects the desired objectives set to the EA Adoption. The resistance is affecting EA adoption by influencing the realization of objectives assigned to the adoption and thus affecting the adoption outcomes.	(Syynimaa, 2015)
Strategic level of EA	The strategic level of EA defines what kind of changes the adoption is desired to achieve.	(Syynimaa, 2015)
Sustainable performance	Sustainable performance of an organization refers to its ability to meet the needs and expectations of customers and other stakeholders on long-term, balanced by an effective management organization by organization staff awareness by learning and applying appropriate improvements, innovation.	(Stanciu, Constandache, & Condrea, 2014)

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List of Abbreviations

AFs	Adoption Factors
AS-IS	The current state of the organisation
BSP	Business Systems Planning
CEO	Chief Executive Officer
CIO	Chief Information Officer
CO	Case Organization
CQ	Closed Questionnaire
CS	Case Study
EA	Enterprise Architecture
EAA	Enterprise Architecture Adoption
EAAM	Enterprise Architecture Adoption Method
EAE	EA Expert at the CO
ERP	Enterprise Resource Planning
ERQ	Empirical Research Question
Fs	Factors influencing adoption
GIS	Global Information Systems
GDPR	General Data Protection Regulation
IQs	Interview Questions
IS	Information Systems
IT	Information Technology
LRQ	Literature Research Question
MI	Manufacturing Industry
MRQ	Master Research Question
REAP	Resistance in Enterprise Architecture Adoption Process
RQs	Research Questions
SA	Stakeholder Analysis
SSIs	Semi-Structured Interviews
TO-BE	The desirable future state of the organisation
TQs	Theory Questions
URL	Uniform Resource Locator

1 Introduction

1.1 Background

The success of the Manufacturing Industry (MI) partially depends on sustainable performance and acting flexibly to market developments. For this, manufacturing companies need transparent information on customer orders, shipped products, finished products, stock, stock of raw materials, work in progress, invoices sent, payments received, etc. (Ross, Weill, & Robertson, 2006). Without the availability of this data, a company cannot respond to market influences and adapt its business operations accordingly. Enterprise Architecture (EA) enables the alignment of an organization's business strategy with its Information Technology (IT) strategy and plays an important part in business and Information Systems (IS) planning in large organizations globally (Ross et al., 2006; Tamm et al., 2011; Zachman, 1987). EA enables companies to proactively implement policies, review and adapt systems to achieve intended business objectives and helps them to make relevant business decisions (Perez-Castillo, Ruiz, Piattini, & Ebert, 2019). However, there are still many challenges, such as adoption and integration within the organization, that are important to realize the intended benefits (Tamm et al., 2011; Weiss, Aier, & Winter, 2013). This study focuses on the factors of resistance adopting EA within the MI.

1.2 Exploration of Enterprise Architecture

EA is still a relatively young discipline because it started in the eighties with IBM's business system planning concept and the Zachman framework for IS architecture. Until 2003 not many academic publications could be found on this topic (Simon, Fischbach, & Schoder, 2013). After 2003 the academic efforts in the research field have increased exponentially. With this growing interest, we can say that EA has now become a lively field of research. According to Ross et al. (2006), EA is the business process organization logic that reflects the integration and standardization of the business model and provides a long-term vision of a companies processes, systems and technology. There is theoretical evidence that many companies are investing in EA and that EA can deliver benefits when companies recognise the added value of EA (Shanks et al., 2018). Although its business value is not yet fully proven, it is a known fact that EA describes both the AS-IS and the TO-BE state of the processes, capabilities, information systems (applications, data, and integration), IT/IS infrastructure and people skills/knowledge of an enterprise and it leads the way from its present form to the target operating model. To accomplish enduring supreme benefits, it is important that the aforementioned organizational structure and design traits should be aligned with its companies strategy (Akın Ateş, van Raaij, & Wynstra, 2018).

1.3 Exploration of the manufacturing industry

1.3.1 Introduction

Companies (Manufacturers) in the MI are those that engage in the transformation of goods, materials, or substances into new products. This transformational process can be physical, chemical, or mechanical. Companies often have plants, mills or factories that produce goods for public consumption. Machines and equipment are typically used in the process of manufacturing, although in some cases, goods can be manufactured by hand (Crandell, 2017).

1.3.2 The Evolution of the Manufacturing Industry

For centuries, goods including food, clothing, houses, and weaponry were manufactured by hand or with the help of work animals. By the beginning of the 18th-century, manufacturing dramatically began to change with the introduction of Industry 1.0, and operations rapidly developed from there. By the beginning of the 19th century, the second evolution began through the transition from steam

to the electric propulsion of machines and inventions, such as light bulbs, the car, photography, telegraphy, airplanes, radio, and film. The third evolution began in the '70s of the 20th century with the introduction of transistors and later chips that made it possible to automate machines to supplement or replace people. This period also led to the development of software systems to take advantage of electronic hardware. The MI is currently in the middle of the fourth industrial revolution (Industry 4.0, Digital transformation), in which we connect machines and devices to the Internet (The Internet of Things). This enables companies to share, analyse and use the information to guide intelligent actions in industrial manufacturing techniques. See Appendix 1 for more details.

1.4 Motivation/Relevance

In today's highly competitive market, digital innovation is crucial. Digital innovation enables the company to work more efficiently, respond more flexibly to changes in the market and create more value. Digitalization is associated with the development of new capabilities that lead to a variety of benefits. These benefits may facilitate both competitive positioning and the pursuit of strategic objectives and are associated with identifying and capitalizing (Feeny, 2001). The dream of every CEO is to have one standardized, integrated, flexible, and manageable landscape of aligned business and IT processes, systems, and procedures. Having complete control over all projects implementing changes in that landscape so that they deliver solutions that perfectly fit the corporate and IT change strategies makes this dream complete (van der Raadt & van Vliet, 2008). EA enables the alignment of an organization's business strategy with its IT strategy and plays an important part in business and IS planning in large organizations globally (Ross et al., 2006; Tamm et al., 2011; Zachman, 1987). EA also makes business operations more standardized, transparent, flexible, understandable and helps to develop a vision. When an organization sees EA as an integrated part of its business strategy, it gains greater insight into its strategy. EA research is needed to support the central role that an EA plays within a company and to identify the different building blocks that are important for the effective implementation of EA.

1.5 Problem statement

Manufacturing companies operate in an everchanging marketplace characterized by variable customer demand patterns, fast-paced technology innovation, the shortening of product life cycles, and increasing specialization and competition in global value chains. New factors, such as the fourth industrial revolution, fast evolution of information and communication technologies or the need to set up alliances among different types of enterprises quickly to benefit from market opportunities, are causing new kinds of problems, like interoperability, to appear in the enterprise modelling context. Manufacturing execution systems (MES) provide real-time information about what is happening on the shop floor for managers and employees. It also forms an information bridge between planning systems used in strategic production management, such as enterprise resource planning (ERP) and production floor control and data acquisition (Panetto & Molina, 2008). EA assists organizations in maintaining the flexibility, cost-efficiency, and transparency of their technical infrastructure, IS, business processes and organizational structures in line with their business goals. EA ensures that corporate change can be implemented swiftly and easily (Ahlemann et al., 2012). Since the MI is currently in a transition to Industry 4.0, it requires a digital transformation that brings new challenges (Hall, 2020). Because manufacturing companies often use legacy systems, this hampers the transition. As a result, it is not easy to achieve optimal alignment between business processes and the business strategy.

1.6 Research objective and questions

As described in Paragraph 1.5, the implementation of EA helps manufacturing companies in their transition to Industry 4.0 and to makes business operations more standardized, transparent, flexible, understandable and helps in developing their business strategy. In this context, it is important that EA is adopted and implemented within the entire organisation.

This study will test existing findings regarding EAA at a Case Organisation (CO) operating within the MI. The result of this research can increase and possibly extend the reliability of the existing conclusions. In determining whether the introduction of EA at companies operating in the MI can help, it is important to know which factors influencing the adoption of EA.

Based on the problem statement, the following Main Research Question (MRQ) has been formulated:

> Which factors related to adopting EA are important when introducing it in the MI?

For answering the main question, the following literature research questions (LRQs) have been formulated to find existing insights:

- LRQs:
    1. What are the existing visions of EA?
    2. What does adoption of EA mean?
    3. What are the benefits of adopting EA in an organization?
    4. What are existing EA adoption models in literature?
    5. Which factors are identified that have an impact on the adoption of EA?
    6. What are the characteristics of the MI?

The knowledge and insights gained from the literature review were used to develop the theoretical framework to test empirically at the CO, which focused on the EAA from the stakeholder's perspective. The empirical research questions (ERQs) are formulated as follows:

- ERQs:
    7. When applying an adoption method in the MI, what are the findings and what can be concluded from them?
    7.1 How can the chosen method and related factors be applied within the MI?
    7.2 What specific stakeholders can be identified in the case organisation?
    7.3 What are the findings from the case study regarding resistance to EAA and the resulting changes?
    8. What are the conclusions of the research conducted?

By answering the LRQs and ERQs, more knowledge could be gained about the factors that influence the adoption of the EA within the MI.

1.7 Main lines of approach

The research approach is shown in Figure 1 and consists of the following steps:

- **Literature research:**
  A literature review was conducted to find answers to LRQs, which form the basis for developing the theoretical framework.
- **Theoretical framework:**
  Using the results of the literature review, the final research model is formed. See chapters 3 and 4 for more information about this process.
- **Empirical research:**
  During the operationalisation of the research, the design of the research was reviewed several times by an EA expert working at the CO. with the help of the theoretical framework, the empirical research is conducted within the CO with is operating in the MI. The result of the literature and empirical research are analysed to make the final discussion, conclusion, recommendations of this report. The report ends with reflections on the work and experiences of the researcher.
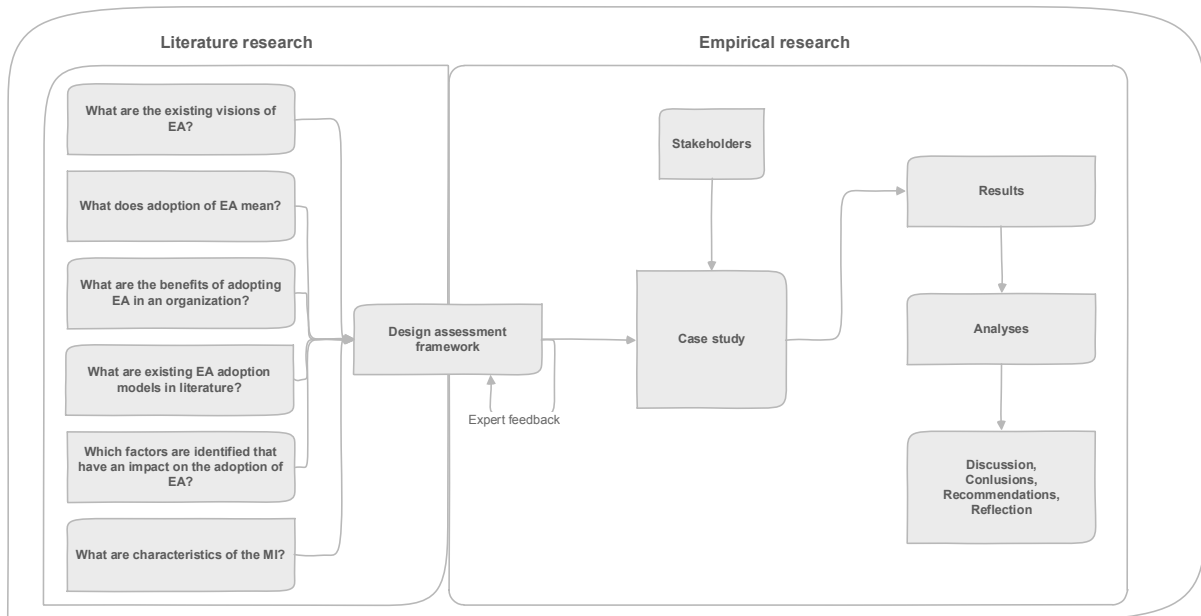
Figure 1: Research model

2 Theoretical framework

2.1 Research approach

By means of literature research, existing relevant information concerning the research field is critically examined. Various sources are consulted, such as scientific journal articles, books, papers, theses, and archival material. In the literature review, the criteria are described by Saunders, Lewis, and Thornhill (2016) (Table 1) applied.

• Literature clearly related to the research question
• The most important scientific theories for the research field
• Up-to-date sources, so that the knowledge is up to date
• Clear references to the original publication

Table 1: Criteria for a critical literature review (Saunders, Lewis, & Thornhill, 2016)

All steps for searching, processing, and reviewing the relevant scientific literature are shown schematically in Figure 2.
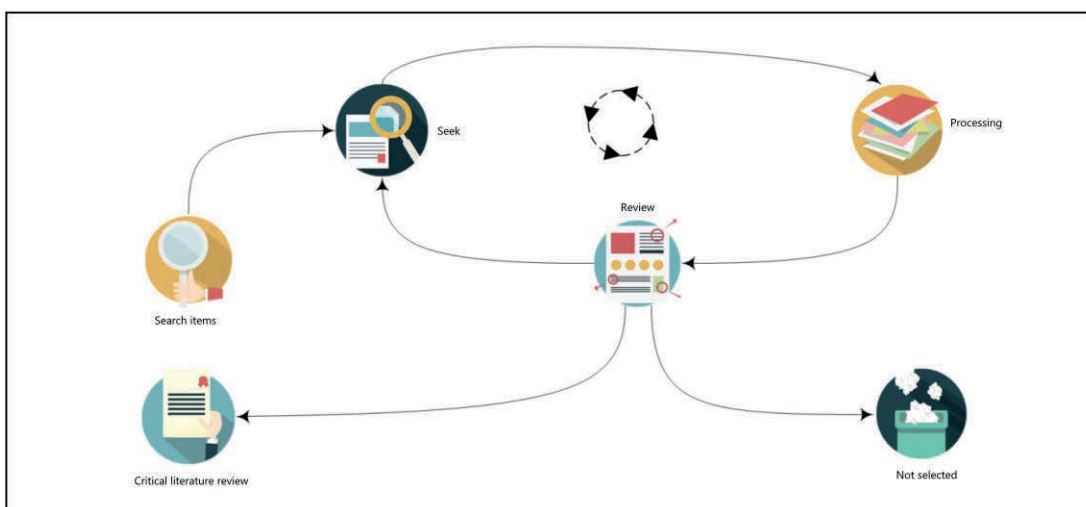
Figure 2: Schematic overview critical literature review (Bennis, 2019)

2.1.1 Search terms

The literature review was formed based on different search terms (keywords, search strings) that were relevant for answering the research questions (RQs). Table 2 below gives an overview of the search terms concerning LRQs and the publication year range. The literature search took place in the year 2021.

LRQ	Search term	PUB. year
1	"enterprise architecture" + definition	>= 2010
1	"enterprise architecture" + vision	>= 2015
2	"enterprise architecture" + adoption	>= 2015
2	"enterprise architecture" + adoption + manufacturing	>= 2015
3	"enterprise architecture" + "adoption model"	>= 2012
3	"enterprise architecture" + "adoption model" + manufacturing	>= 2012
4	"enterprise architecture" + factors + adoption	>= 2015
5	"enterprise architecture" + benefits + adoption	>= 2015
5	"enterprise architecture" + benefits + adoption + manufacturing	>= 2015

Table 2: Overview search terms

2.1.2 Search steps

A filtering technique and the snowball method are used to search for relevant articles based on the search terms. Figure 3 gives a schematic overview of the search steps used.
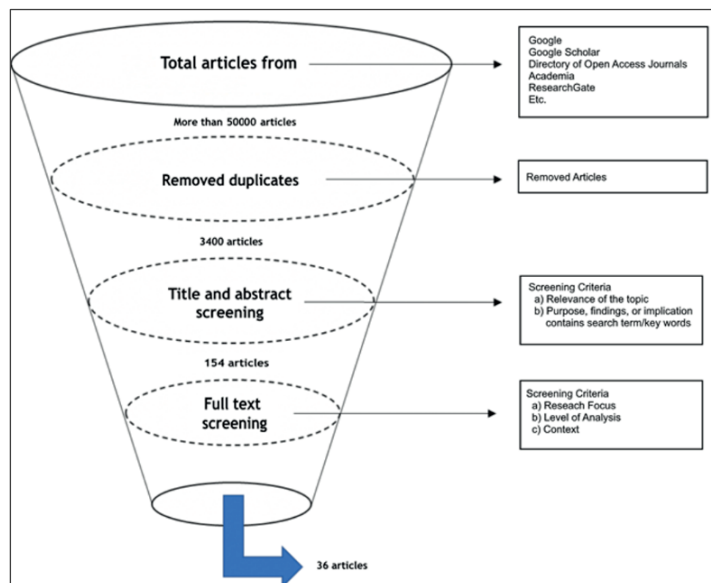
Figure 3: Literature Selection, Filtering and Review Structure

2.1.3 Processing

For reproduction, enough and correct data must be available from the selected publications. Saunders et al. (2016) describe which bibliographic data are relevant. For all publications used, the title, the year of publication, the author, how often it is quoted and the URLs to the source are stored for reproduction. A detailed overview is included in Appendix 2.

2.1.4 Rating search results

The publications have been studied according to the six reading instructions of Gilroy (2018) from Table 3.

1	Preview
2	Annotate
3	Outline, Summarize, and Analyse
4	Look for repetitions and patterns
5	Contextualize
6	Compare and Contrast

Table 3: 6 reading instructions of Gilroy (2018)

2.2 Implementation

2.2.1 Data sources and research strategy selection

By means of searches in the following databases: ACM Digital Library, Cite seer, Business Source Complete and Academic Search Elite from EBSCO, Emerald Insight, IEEEXplore Digital Library, ScienceDirect, SpringerLink, ResearchGate, Google Scholar and the library of the Dutch Open University. The search terms, described in Paragraph 2.1.1, were applied to search all parts of the found articles as in the title, the abstract and the main body.

2.2.2 Search results

Below is a summary of the number of articles found based on the search term. Because of the large number of articles available, the search results were limited to exclude older (irrelevant) publications to publication year, as shown in Table 4.

LRQ	Search term	PUB. year	Number of hits (approx)
1	"enterprise architecture" + definition	>= 2010	16,100
1	"enterprise architecture" + vision	>= 2015	14,600
2	"enterprise architecture" + adoption	>= 2015	10,300
2	"enterprise architecture" + adoption + manufacturing	>= 2015	6,590
3	"enterprise architecture" + "adoption model"	>= 2012	224
3	"enterprise architecture" + "adoption model" + manufacturing	>= 2012	144
4	"enterprise architecture" + factors + adoption	>= 2015	7,810
5	"enterprise architecture" + benefits + adoption	>= 2015	7,970
5	"enterprise architecture" + benefits + adoption + manufacturing	>= 2015	6,640

Table 4: Summary search results

A more detailed overview of the results per search term, library link, keywords, download location (URL) to the article can be found in Appendix 2.

2.2.3 Refining the search results

The search results summarized in Table 4 were evaluated further in terms of their usefulness. For this purpose, the six reading instructions in Paragraph 2.1.4 have been applied.

2.3 Literature review and conclusions

2.3.1 LRQ 1: What are the existing visions of EA?

Almost every publication on EA cites the Zachman Framework (Zachman, 1987) as a seminal EA publication that fundamentally shaped the discipline of EA. Authors routinely call John Zachman the 'father' of EA and consider his framework paper to be the initial breakthrough publication that created the very concept of EA and significantly influenced its modern understanding. Moreover, the authors argue that the Zachman Framework inspired all other subsequent EA frameworks and methodologies (S Kotusev, 2016). S Kotusev (2016) research describes that EA originated earlier and

stems from the Business System Planning (BSP) methodology initiated by IBM in the 1960s. The BSP methodology formed the initial basis for all current EA methodologies and frameworks:

- the concept of information system architecture,
- a top-down architecture planning approach,
- a formal step-by-step architecture planning process,
- various diagrams and matrices to describe the architecture.

The pre-EA period in the EA's history lasted approximately from the 1960s to in the 1980s. In fact, EA can be seen as the successor to IBM's BSP. Whatever the finding on who the founder of EA is (IBM-BSP; Zachman), today, there are even more explanations possible in what EA is and what visions there are. Roos and Mentz (2018) describe that the primary goal of EA is to lead the business from its current state (AS-IS) to a desirable future state (TO-BE). However, organisations will have to make important decisions about their business processes and the IT systems that support those business processes to lead the organisation to a desired future state. To achieve this, the EA must have the necessary mandate within the organisation. See Appendix 3 for more different views on EA.

Conclusion

Depending on the research topic, the vision of EA is described differently. Regarding the goal of EA, there is consensus that the primary goal of EA is to lead the business from their AS-IS to TO-BE state. On the road to the TO-BE, organisations must make important decisions regarding their business processes and the IT systems that support these business processes. EA also describes the important choices that need to be made in the form of principles, guidelines, and models. EA requires a mandate within the organisation.

2.3.2 LRQ 2: What does the adoption of EA mean?

EAA can be defined as 'the action or fact of adopting or being adopted' EA where adopt refers to 'choose to take up or follow (an idea, method, or course of action)' (Syynimaa, 2015). Seppänen (2014) described EAA as the process by which the practices of 'Enterprise Architecting' are first initiated, implemented, and institutionalized in an organization. The success of the EAA has everything to do with the characteristics that an EA has to meet; communication and the possible results expected by stakeholders. Adopting EA as a strategy should happen at all stakeholder levels to ensure that the functionality of the enterprise is understood in order to handle change fast and effectively and stay competitive in their business (Gilliland, Van Der Merwe, & Kotzé, 2013).

Conclusion

In EAA, human factors play a significant role. Stakeholders in the organization need to understand EA's purpose and importance to overcome resistance to the introduction of EA. Adopting EA as a strategy should happen at all stakeholder levels.

2.3.3 LRQ 3: What are the benefits of adopting EA in an organization?

Nowadays, organizations must continuously adapt their activities to changing market conditions. As a result, they are forced to change their business model constantly. Standardization of business processes is an important transition to ensure continuity. This can be a difficult task as the organizational structure and reporting processes are often based on legacy systems. Because of this, planning and managing transformations can be a daunting task, as complexity has crept into the organization over the years (Niemi & Pekkola, 2019). As a result, the speed of innovation often stagnates, and they lack the necessary flexibility and knowledge to maintain or increase their market position. To realize changes within the business processes, it is important to understand how the process supports the strategic goals of the company and what changes can influence the process and vice versa. Business standardization is the concurrent need to find common ways of gaining business process efficiencies across the company to reduce working capital and to leverage human knowledge

across the business and product units for organizational learning (Kettinger, Marchand, & Davis, 2010). EA is an instrument for standardizing and integrating business processes to achieve enterprise-level goals (Boh & Yellin, 2006). EA brings for the company many benefits because it encompasses the organization's business capabilities, business processes, information, IS, and technical infrastructure and facilitates the integration of strategy, personnel, business, and IT (Kaisler, Armour, & Valivullah, 2005). Many EA benefits are intangible, and value is achieved indirectly within the business ability to change (Shanks et al., 2018). Implemented business processes and information systems must be continuously adapted. As changes may be triggered from the business as well from developments in technology, a continuous alignment of business and IT is needed (Hinkelmann et al., 2016). Many studies exist about the benefits of EA, for example, reduce IT costs, more effective use of resources, improve agility and innovation, reduce complexity, and improve business and IT alignment (Boucharas et al., 2010; Foorthuis et al., 2016; Foorthuis et al., 2010; Tamm et al., 2011; Wan et al., 2013). The Architecture Center (2020) describes the key benefits of EA for an organization as follows:

- a strategic overview,
- reducing complexity,
- trimming costs,
- standardisation and flexibility,
- security gains,
- change analysis and adaptability.

See Appendix 7 for more detailed information.

Conclusion

EA is a tool for standardisation and increasing flexibility, cost reduction and provides an overview of interdependencies and points of synergy. EA is conducive to technological innovation, transformation, and smooth implementation of existing technology. It enables management to achieve their business objectives and follow a coherent strategy optimal for the entire company.

2.3.4 LRQ 4: What are existing EA adoption models in literature?

The most recent EAA models found are designed by Syynimaa (2015). His research took place in the domains of higher education in Finland. For this purpose, he developed the 'Resistance during the EAA Process model' (REAP), which explains the change resistance during the EAA process. In that same year, Syynimaa (2015) developed a second model, 'EAA Method' (EAAM), to overcome the limitations of traditional EAA methods. The model REAP is based on EA and organizational change and describes a theoretical assessment framework that illustrates the potential resistance to EAA and how this can be avoided. Syynimaa (2015) developed the REAP model and EAAM in the context of higher education institutions in Finland and tested its applicability by means of interview questions based on 25 factors influencing the adoption of EA, drawn from his literature review.

By using the REAP model, organisations can anticipate and prepare for resistance to organisational change during the EAA. EAAM enables organisations to increase the likelihood of a successful EAA and helps to obtain mandates from senior management. For this, EAAM adds two sub-processes to the traditional adoption process, namely: 'Explain the benefits of EA' and 'Organise learning from EA'. Using these processes minimises the resistance to EAA caused by a lack of knowledge and understanding of EA concepts. Syynimaa (2015) describes that EAAM is likely to be applicable to other domains as well. Stakeholders are the most important persons in the EAA. A stakeholder analysis is a crucial input source for the models of Syynimaa (2015). More detailed information about REAP and EAAM can be found in Appendix 5 and Appendix 6.

Conclusion

> EAA is a process that is aimed at the acceptance and successful implementation of EA. Stakeholders are the most important persons in adopting EA. The REAP model and EAAM designed by Syynimaa (2015) are applicable instruments to understand and diminish the resistance to EAA.

2.3.5 LRQ 5: Which factors are identified that have an impact on the adoption of EA?

EA is the instrument for organizations to manage their business processes and give more insight into their organizational structure. It is imperative that an EA is not only seen as an Information Technology (IT) issue but also as a strategic and organizational challenge (Scholtz, Calitz, & Connolley, 2013). One way to solve the challenges above mentioned is to define EA standards to guide departments and business units in their choices and decisions at the project level regarding data and application design. EA standards are a set of policies, rules, and guidelines that unite the principles and practices of business units and projects; they provide the organizing logic for applications, data, and infrastructure technologies (Boh & Yellin, 2006).

Changes within an organization will always provoke resistance, regardless of the magnitude of the change. E.g., employees are afraid that they will lose their autonomy/flexibility and that EA will slow down rather than accelerate changes. EAA can also be undermined by ignorance, fear of job losses, and lack of support from stakeholders and top management. Correspondingly, lack of communication during changes can lead to uncertainty, which may be a key source of change recipients' difficulties during change implementation (Oreg, Vakola, & Armenakis, 2011). This resistance can be deliberate or unintentional and be recognized by the target and the observer (Hollander & Einwohner, 2004). Research by Mezzanotte Sr, Dehlinger, and Chakraborty (2010) has shown that poor communication is one of the main factors contributing to the failure of EAA. Recognizing the value of EA has a direct impact on the way EA is understood within the organization (Nassiff, 2012).

Conclusion

> Introduction and change of the EA evoke resistance through fear of loss of autonomy/flexibility, loss of jobs, lack of communication and lack of support from stakeholders. The lack of awareness among stakeholders about the benefits of EA has a direct impact on the implementation of EA.

2.3.6 LRQ 6: What are the characteristics of the MI?

MI refers to the part of the economy characterized by the production and further processing of material goods or commodities in factories and plants, combined with a high degree of mechanization and automation in contrast to the artisanal form of production (Wikipedia.org, 2011). In the MI, the first systemic paradigm is where man and machine are organized as one system at the process, management and business level to produce an integrated and interoperable business system (Panetto & Molina, 2008). To ensure coherence between the business processes, communication and the exchange of information are important factors. Unfortunately, this does not always work out smoothly, resulting in a less effective and efficient production information system (Panetto & Molina, 2008).

Currently, the MI is undergoing a transition from Industry 3.0 to Industry 4.0, also known as the digital transformation. As many legacy systems are still in use, this transition is challenging due to their complexity (Niemi & Pekkola, 2019). These days, a new challenge is introduced by climate change, minimise the carbon footprint and pollution. Here can EA be an essential instrument to keep the transition manageable and maintainable (Boh & Yellin, 2006; Goerzig & Bauernhansl, 2018). This is reinforced by the proposition of Kornyshova and Barrios (2020) that EA provides a whole vision, using sets of models or blueprints, of an organization along with its information technologies, business processes and strategies.

The MI is currently undergoing a transition from Industry 3.0 to Industry 4.0 and has challenges in terms of carbon footprint and pollution. EA can be an essential instrument to keep all these changes manageable and maintainable!

2.3.7 Conclusion literature review

Literature insights show that the vision of EA is different depending on the research topic. Regarding the purpose of EA, there is agreement that the primary goal of EA is to lead the company from its AS-IS to a TO-BE state. EA describes important choices to be made in the form of principles, guidelines and models and is an essential instrument for standardisation and integration to achieve business objectives (Boh & Yellin, 2006). It also offers suitable methods to support the alignment of the internal IT landscape (Goerzig & Bauernhansl, 2018), and it can act as the blueprint to understand and guide large and complex organizations (Xu, Xu, & Li, 2018). When adopting EA, organizations gain several benefits such as better decision making, increased revenues and cost reductions, and alignment of business and IT (Syynimaa, 2015). The key benefits of EA for an organization are (Architecture Center, 2020):

- a strategic overview,
- reducing complexity,
- trimming costs,
- standardisation and flexibility,
- security gains,
- change analysis and adaptability.

One of the major challenges for the MI is to become more competitive, efficient, and environmentally friendly. The MI is currently undergoing a transition from Industry 3.0 to Industry 4.0 and has challenges in terms of carbon footprint and pollution. EA can provide a supporting role in this transition because it can be seen as the instrument that connects an organisation's corporate mission and strategy of an organisation to its IT strategy (Boh & Yellin, 2006; Goerzig & Bauernhansl, 2018; Kornyshova & Barrios, 2020).

To harness the benefits of EA, it is essential that EA is adopted throughout the organisation. EA adoption may encounter resistance due to fears of loss of autonomy and flexibility, loss of jobs, lack of communication and lack of support from stakeholders. In this respect, it is important to understanding which factors have an impact on the adoption process.

Saunders et al. (2016) describe, in the case of time limitations, the possibility of integrating elements of a deductive approach by using propositions from theory and testing their applicability. Based on this statement, this study builds on Syynimaa's existing theories on EAA. To better understand the adoption process within the domain of the MI, Syynimaa's REAP model will be applied. By applying the REAP model, the factors influencing the EAA are tested. With the results, EAAM can then be used to overcome the limitations of the traditional EAA. Both allow organisations to increase the adoption of EA and gain more mandate.

As described earlier, the MI faces many challenges to reach the TO-BE. Due to the time limitation of this study, these challenges are limited to:

- Ability to change,
- The mandate of EA,
- Adoption EA,
- Stakeholder support.
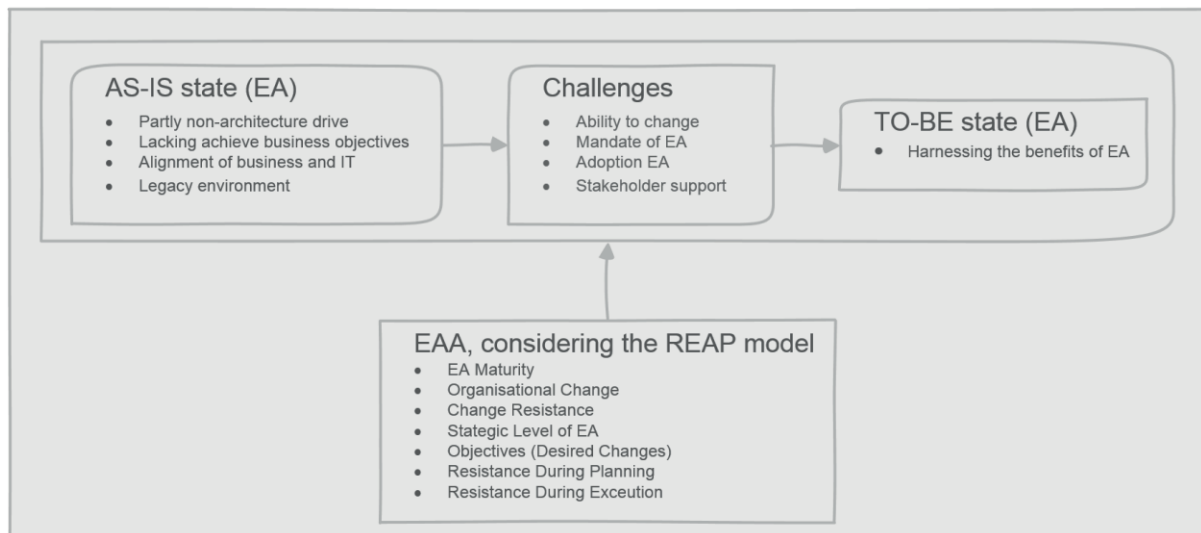
Figure 4: The conceptual model for EAA within the MI

The literature research reveals that the primary goal of EA is to lead the business from its current state (AS-IS) to a desirable future state (TO-BE) (Roos & Mentz, 2018). This study examines EAA in the MI. Figure 4 shows the conceptual model for EAA and forms the basis for the operationalisation of the empirical research.

For further explanation of the REAP model and EAAM, see Appendix 5 and Appendix 6.

2.4 Objective of the follow-up research

The literature research shows that within the existing literature, little is known about EAA in the MI. This research, therefore, provides new insights for the MI in which factors have an impact on EAA. Regarding existing literature, this means that EAA is evaluated in a broader context and provides additional knowledge concerning EAA in the MI. The newly gained insights can possibly also be applied to organisations that are not active in the domain of the MI.

3 Methodology

In the previous literature review, answers were found to discuss and analyse the main motivation theories about EAA in the MI and to lay the foundation for the empirical research. The paragraphs below describe how specific research choices were made to design the conceptual design. In the previous literature review, answers were found to discuss and analyse the most important motivational theories regarding EAA in the MI that laid the foundation for the design of the empirical research. The paragraphs below describe how specific research choices were made designing the conceptual design.

3.1 Conceptual design

The research takes place at a CO in the MI and will be divided into two parts. First, it is necessary to determine which stakeholders are important regarding the data collection. The second part is intended to collect data that will be used to answer the ERQs.

The research method must comply with the following characteristics:
- Deductive research approach.
- Research should be suitable for a group of respondents that will be smaller than twenty.
- Must be achievable within the required graduation time.

Saunders et al. (2016) describe the difference between induction and deduction approach as:
- With induction, data are collected, and a theory is developed because of the data analysis.

- With deduction, a theory and hypothesis (or hypotheses) are developed, and a research strategy is designed to test the hypothesis.

As indicated earlier, the research uses the existing theory of Syynimaa (2015) to test EAA. With this approach, the study will follow a deductive approach.

Characteristic		
Research method	Deductive / Inductive	Quantitative / Qualitative
Experiment	Inductive	Quantitative
Survey research	Deductive	Quantitative
Case study	Inductive / Deductive	Qualitative
Grounded theory	Inductive	Qualitative
Ethnography	Inductive	Qualitative / Quantitative
Archive research	Inductive / Deductive	Qualitative

Table 5: Saunders (2016) different research methods

Table 5 shows an overview of the research methods defined by Saunders et al. (2016). Because of the criteria set out above, the number of respondents will be less than twenty (N=<20), a survey will be automatically dropped out. As no causal link is established in this research, this method is not suitable. The grounded theory research method could be done because of the deductive approach chosen, but the purpose of the research method is ethnographic research which makes it inappropriate. Archival research aims to search for evidence in archival records and is therefore not applicable. The archival research will be used as an additional controlling research method. Of the six research methods, the Case Study (CS) remains and is the method that will be used for this research with a qualitative approach. The CS strategy has the capacity to generate insights from intensive and in-depth research into the study of a phenomenon in its real-life context, leading to detailed, empirical descriptions and development of the theory (Dubois & Gadde, 2002; Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Ridder, Hoon, & McCandless Baluch, 2014; Yin, 2014). CS meets all the requirements of the research criteria and gives the flexibility to collect data by means of interviews, and makes it possible to steer to the data that is needed. Because the research focuses on the entire enterprise, we can speak of a holistic CS. Now that it has been determined that the data collection takes place by means of interviews, it is also necessary to determine which form of interview technique, see Table 6, can be used.

	Exploratory	Descriptive	Explanatory	Evaluative
Structured		✓✓	✓	✓
Semi-structured	✓		✓✓	✓✓
Unstructured	✓✓			✓

✓✓ = more frequent, ✓ = less frequent

Table 6: Use of different types of interviews for research purposes (Saunders, 2016)

Interviews will be held with stakeholders to collect data. During the interviews, new insights may arise, resulting in new questions. Because of this nature, it has been decided to use Semi-Structured Interviews (SSIs). One of the benefits of SSIs is that managers are more likely to participate in an interview, as opposed to filling in a questionnaire (Saunders et al., 2016). The disadvantage of a semi-structured interview is that there is a chance that the interviewer's opinion, consciously or unconsciously, may influence the answers to the questions (Saunders et al., 2016). Before the interviews can be held, it is necessary to identify the stakeholders by means of a Stakeholder Analysis (SA) to determine who can provide relevant and reliable information. Once stakeholders have been identified, they will be asked to share available documentation on the organization's current EA. The

documents collected are analysed to gain insight into the available knowledge and procedures. The insights obtained will form the basis for setting up SSIs.

3.2 Technical design

The data collection will take place by interviewing EA stakeholders within the CO. A SA will be used to identify those within the CO who can provide relevant information.

3.2.1 Stakeholder analysis

The data collection will take place by interviewing EA stakeholders within the CO. To identify the stakeholders; an SA will be conducted to determine which stakeholder can provide relevant information. After the initial selection of stakeholders, the influence of the stakeholder within the organization will be assessed and categorized. After this, the stakeholders will be ranked according to their importance for the organization, considering the power, legitimacy, and ability of the stakeholders. At its core, it is based on a stakeholder classification in which classes are formed as a function of authority, legitimacy, and urgency. The different combinations of the above three classifications result in seven stakeholder classes. The complete description of the stakeholder analysis is included in Appendix 4.

3.2.2 Data collection by closed questionnaire

In addition to the SSIs, a Closed Questionnaire (CQ) about the factors that influence EAA will also be part of the data collection. The data acquired will be used to verify the collected and analysed interview data to apply triangulation to increase the reliability of the data.
By sending out a CQ, it is possible to question a larger group of people while guaranteeing objectivity. However, there is also a disadvantage to this research method that there is little influence on the response rate, so it is quite possible that there will be a relatively low response. In the CQ, the last question will ask for participation in SSIs.

3.2.3 Data collection through semi-structured interviews

The conceptual model shows that data collection takes place through SSIs to answer the empirical questions in Chapter 1. This interviewing method brings the flexibility to which the interviewee can contribute their insights. In addition, there is an interaction based on which feedback can also be obtained regarding improving the concept assessment instrument. A disadvantage of a semi-structured interview is the chance that the interviewer's opinion, consciously or unconsciously, may influence the answers to the questions (Saunders et al., 2016). Data collection will be performed in two phases:
1. Through a CQ, stakeholders will be asked which adoption factors influence the adoption of EA to a certain extent. Stakeholders will also be invited to cooperate in follow-up SSI research.
2. Stakeholders will be interviewed using SSI.

For the design of the assessment tool, the existing literature will be used. This literature can add proven benefits and critical success factors of EA. Once the assessment tool has been drafted, the assessment tool will be presented to an EA expert within the CO to review it on relevance and accuracy. The interview will always start with the question of whether the interviewee gives permission to record the session and whether the recordings may be used for further processing into research results. Only when the interviewee has given their consent can the interview begin. During the interview, notes will also be taken because the audio does not record all information such as observation. This information will help to recall the context and content of each interview and informs about the interpretation, and the circumstances of the data collection are better remembered (Saunders et al., 2016). In principle, all stakeholders are asked the same questions. Still, due to the flexible, interactive character of the SSIs, interesting new questions may arise that were not initially considered and missing in the assessment tool. When this occurs, the assessment tool will be adjusted, and the added questions will be presented to the previously interviewed persons. An

interviewee will likely be approached one more time to answer the additional questions. After each interview, the transcription of the audio recordings will take place.

3.3 Data analysis

To be able to analyse the collected qualitative data must first be transcribed. Because transcribing is time-consuming, Amberscript (https://www.amberscript.com/) is used to transcribe the audio files. These transcriptions were analysed using a thematic analysis method described by Saunders et al. (2016). To analysing these transcripts, ATLAS.ti (https://www.atlasti.com) is used. ATLAS.ti supports thematic analysis, which simplifies the analysis of transcription files. The transcription files were in ATLAS.ti coded to find themes and patterns. For this coding process, the following coding steps are used:

1. Open coding: coding text fragments (assigning labels).
2. Axial coding: comparing text fragments with the same code for differences and similarities.
3. Selective coding: developing concepts into a theory and searching for exceptions through constant comparison.

The encoding process is applied iteratively. E.g., when arriving at phases 2 or 3, a jump back to phases 1 was possible. Therefore, coding was not a fixed process. After encoding, the results were analysed, and the results were shared with the respondents, reviewing and making additions where necessary.

3.4 Reflection on validity, reliability, and ethical aspects

Information on validity, reliability and ethical aspects is described below.

3.4.1 Construct validity

Construct validity is the degree to which the used measurements test the theory. The following measures are taken to increase the validity of the data:

- Before the interviews can begin, the questions formulated will be submitted for verification to the experts (tutor and an EA expert) to minimize misunderstandings about the terms used during the interviews.
- The final research model is based on the conceptual model (Figure 4) and built on scientific research to ensure a solid basis and reduce bias in the research results.
- The REAP model of Syynimaa (2015) is the basis of the final empirical research model. The use of Syynimaa's work provides a solid foundation because his work has already been recognized by science through peer reviews. The units of measurement will be derived from his work. The SA used is scientifically proven.
- The final design based on the theories described above is presented to an EA expert on the research subject for verification. This was an iterative process to integrate the correction(s), advice(s) and possible recommendations into the research model.
- To avoid researcher bias, the tutor and an EA expert will check the wording of the questions for objectivity. This validation is essential to reduce misunderstandings about the terms used during the interviews.

3.4.2 Face validity

In order for the interviewee to be able to answer the interview questions, it is important that the right stakeholders are selected. During the interviews, the interviewee will be observed to what extent he or she understands the questions and is able to answer them. If there is an impression that the interviewee has insufficient knowledge, this interview data will not be included in the data analysis.

3.4.3 Internal validity

Internal validity indicates whether the results are about what they appear to be about (Saunders et al., 2016). To ensure the reliability of the interview data, methods generally accepted in scientific

studies will be used. Before the conclusions and recommendations can be formed, the results will be triangulated first to ensure that the interpreted information reflects what it is intended to present in the context of this case study. The interviews will be recorded, and notes will be made of the observations. The researcher will ensure objectivity and respect the interviewee's answers regardless of his or her opinion. Also, the researcher will never direct the interviewee in devoting his or her word. After each interview, the results of the assessment tool will be evaluated together with the interviewee to check whether the cases have been understood by both parties from the responses. The researcher will ensure that the questions are relevant to the research question.

3.4.4 External validity
The external validity indicates the extent to which the results of the study can generalize all relevant contexts (Saunders et al., 2016). Due to the chosen research strategy, the degree of generalizability is limited. The results of the SSIs are partly based on the CO. However, it is plausible that the conclusion of this research also applies to other organizations within the production environment. Additional research is needed to prove this.

3.4.5 Reliability
Peer-reviewed articles were used as much as possible to increase the reliability of this study. The data derived from SSIs are challenging to reproduce because they reflect reality at the time they were collected (Saunders et al., 2016). It is therefore questionable whether a repeat of the research will bring the same results. The selection made using the SA is significant for the reliability of the data. By recording the interview, transcribing it, working it out into a report, and then asking for feedback on its accuracy, the reliability of the collected data is increased.

3.4.6 Ethical aspects
The involvement of human participants in the collection of research data and information and the possibility of business secrets being involved makes it necessary to comply with ethical rules. These rules are applied to protect the rights of participants and are part of the Dutch Research Integrity Code of Conduct. The most important criteria for research with human participants are (Althoff et al., 2019):
1. complete information,
2. written consent,
3. debriefing,
4. all personal data will be anonymized,
5. withdraw their participation in the research at any time, without any consequences,
6. confidentiality.

If the information contains business secrets, these will be used but not described without permission and after evaluation by the interested parties. As regards personal data, the rules set out in the General Data Protection Regulation (GDPR) will be applied.

4 Implementation and results of empirical research

4.1 Introduction
Below is a schematic overview of the phases that have been followed to answer the ERQs. At the start, a Stakeholder Analysis (SA) (Paragraph 4.2) was conducted, followed by the operationalization of the research objectives (Paragraph 4.3). Both steps were discussed with an EA expert within the CO, and feedback was then applied to the research methods (Paragraph 4.6).
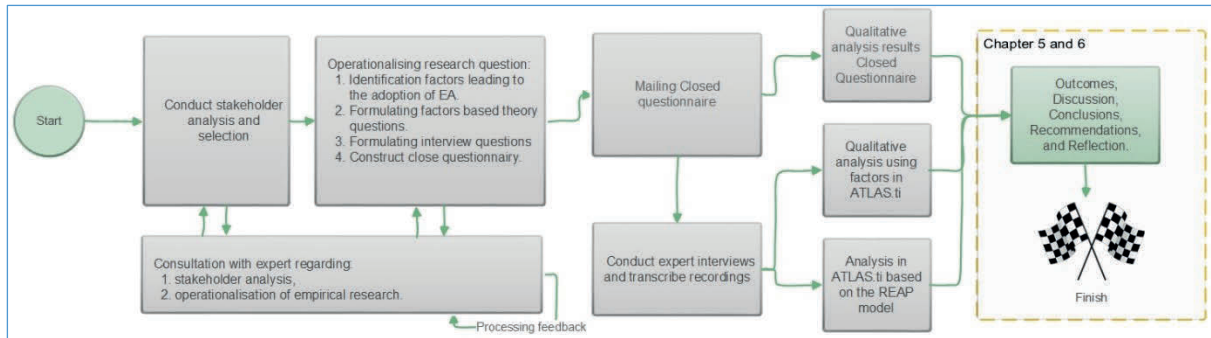
Figure 5: Steps in empirical research

4.2 Stakeholder analysis

4.2.1 Introduction

An SA was conducted to identify which EA roles were relevant for collecting a purposive sample of research data. In other words, the stakeholders were chosen based on the best judgment of the researcher and the EA Expert (EAE). This approach was chosen because this case study research uses a small sample of stakeholders to obtain research data. As part of the SA, Bryson (2004) basic technique and ranking, according to Mitchell, Agle, and Wood (1997), are used as described in Appendix 4. EA stakeholders are the individuals who have an interest in the company's EA and who can influence or be influenced by it and contribute to the organisation's objectives.
Within the EA of an organization, different roles (functions) are defined, each with its changeability. There are several different roles & responsibilities of enterprise architects working in the EA team. It is important to realise that the same person may have multiple roles (Hinkelmann et al., 2016).

4.2.2 Identification of EA stakeholders

Ahlemann et al. (2012) define the stakeholders as those responsible for EA-related decisions, as well as those who must put it into practice and are involved in EA initiatives. The EA roles have been inventoried according to the selection criteria of Berg and Steenbergen (2004).

During the identification process, it became clear that within the CO, a difference has been made in the roles of Business Architect and Domain Architect. Both roles have been merged into the role of Business Domain Architect and are performed by one person, see Table 7.

#	Stakeholder inventory
1	Business Domain Architect
2	Business Analyst
3	Chief Information Officer (CIO)
4	Chief Technical Officer (CTO)
5	Enterprise Architect
6	General managers
7	Information (Data) Architect
8	IT managers
9	Line managers
10	Portfolio Manager
11	Programma Manager
12	Project Architect
13	Project Manager
14	Service managers
15	Solution Architect
16	Technical (ICT) Architect

Table 7: Inventory EA roles at the CO

To identify which stakeholder is important for the data collection, the stakeholders listed in Table 7 were ranked according to their importance to the organisation, taking into account the power, legitimacy and urgency of the stakeholders (Mitchell et al., 1997). By applying this ranking, the

stakeholders were selected (Table 8). The stakeholder typology is visualised using a salience model (Figure 6).

#	Stakeholder inventory	Importance	
1	Business Domain Architect	Power	= false
		Legitimacy	= true
		Urgency	= false
2	Business Analyst	Power	= false
		Legitimacy	= true
		Urgency	= true
3	Chief Information Officer (CIO)	Power	= false
		Legitimacy	= true
		Urgency	= true
4	Chief Technical Officer (CTO)	Power	= true
		Legitimacy	= true
		Urgency	= false
5	Enterprise Architect	Power	= true
		Legitimacy	= true
		Urgency	= false
6	General managers	Power	= true
		Legitimacy	= true
		Urgency	= true
7	Information (Data) Architect	Power	= false
		Legitimacy	= true
		Urgency	= true
8	IT managers	Power	= false
		Legitimacy	= true
		Urgency	= true
9	Line managers	Power	= false
		Legitimacy	= false
		Urgency	= false
10	Portfolio Manager	Power	= false
		Legitimacy	= false
		Urgency	= true
11	Programma Manager	Power	= true
		Legitimacy	= false
		Urgency	= true
12	Project Architect	Power	= false
		Legitimacy	= true
		Urgency	= true
13	Project Manager IT	Power	= false
		Legitimacy	= false
		Urgency	= true
14	Service managers	Power	= false
		Legitimacy	= true
		Urgency	= true
15	Solution Architect	Power	= false
		Legitimacy	= true
		Urgency	= false
16	Technical (ICT) Architect	Power	= false
		Legitimacy	= true
		Urgency	= true
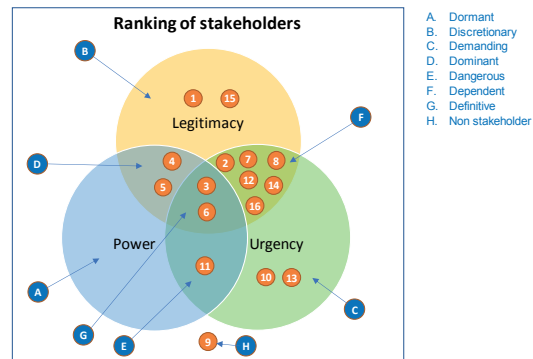
Figure 6: Stakeholder typology CO

Legend:
A. Dormant
B. Discretionary
C. Demanding
D. Dominant
E. Dangerous
F. Dependent
G. Definitive
H. Non stakeholder

Table 8: Stakeholder classification, according to Mitchell et al. (1997)

See Appendix 4 for further explanation of the SA.

4.3 Operationalisation of research objectives

4.3.1 Introduction
For the operationalisation of the research objectives, this study builds, as described in Chapter 3 'Methodology', on the work of Syynimaa (2015) and uses Syynimaa's REAP model for the verification of the research data. To collect the research data, a CQ and SSIs are conducted. The collected research data is used for further analysis to answer the main and sub-questions of this study. The REAP model and the related 25 adoption factors of Syynimaa (2015) were used to provide more insight into the factors related to EAA.

4.3.2 Identification of the factors influencing the adoption of EA
As previously mentioned, this study makes use of the adoption factors (AFs) and the REAP model drawn up by Syynimaa (2015). Syynimaa carried out a systematic literature review to determine which adoption AFs influence EAA. As a result of his research, 25 AFs emerged that could influence adoption. These AFs are grouped into three different main categories, namely:
1. Organisational (18),

2. Enterprise Architecture related (4),
3. Environment-related (contextual) (3).

The number between the parentheses is the number of AFs identified for each category. Figure 7 shows an overview of the categories with their associated adoption factors. As can be seen, the category 'Organisational' has most of the AFs that influence the adoption of EA. Syynimaa's research was about people within higher education institutions. The CO is operating in the MI, where business processes are leading. For this, Syynimaa's adoption factor 12, 'EA is more about people than technology', has been changed to 'EA is more about processes than technology'. This was done in consultation with the EA expert from the CO.
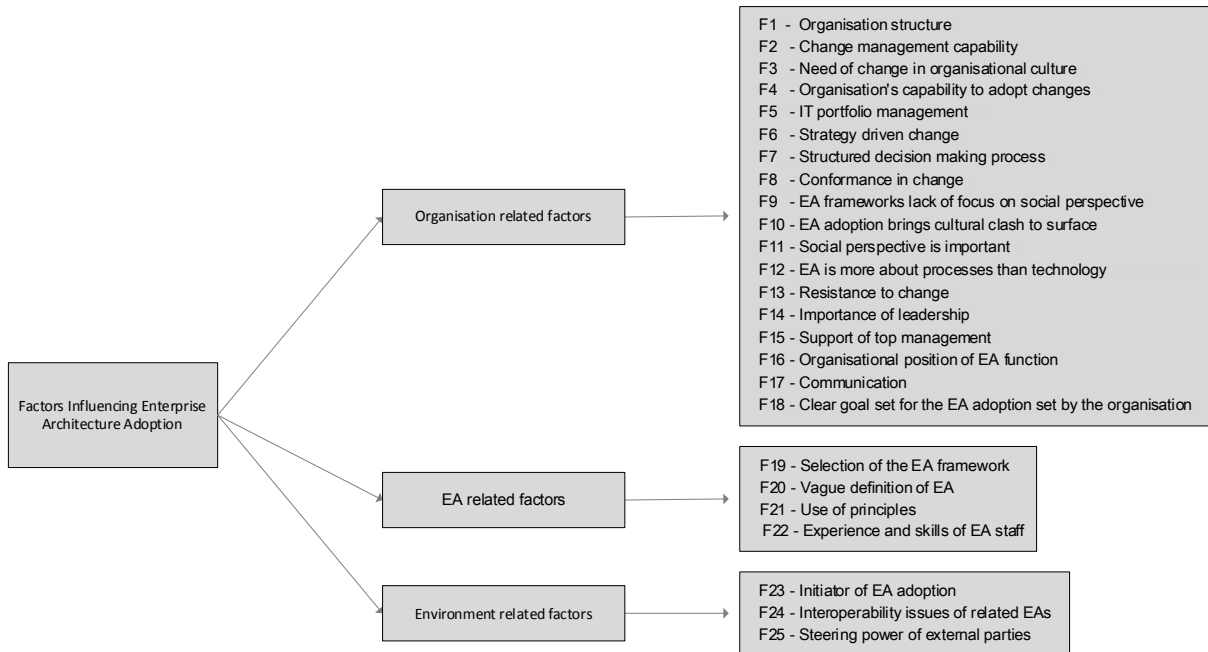
Figure 7: Factors influencing EA adoption (Syynimaa, 2015)

4.3.3 Formulating Interview Questions

Following Syynimaa (2015), based on the AFs in Figure 7, interviews were conducted to collect research data. With the help of these factors, Syynimaa (2015) formulated Theory Questions (TQs) listed in Figure 8.

Syynimaa (2015) translated the listed TQs (Figure 8) into IQs (Figure 9). As this research takes place in the MI, the questions are slightly adapted to the context of the CO. After discussion with the EA expert at the CO, two questions have been added to the interview questions list, namely IQ0 and IQ9.

Because Syynimaa's interview questions start with 'Think about some major change(s) your organisation have faced during the past few years…..' (IQ1), interview question 0 (IQ0) has been added to first get a clear idea if any changes have taken place in the last few years. If this is not the case, Syynimaa's IQ1 question is superfluous. Interview question 9 (IQ9) has been added to gain more insight into how EA changes are accepted and supported by various stakeholders, following Syynimaa's IQ8.

Figure 8: Theory questions based on factors (Syynimaa, 2015)

The figure shows a hierarchy with "Theory questions based on factors" branching into three categories:

Organisation related questions
- TQ1 - What is organisation's capability to adopt changes?
- TQ2 - What is the level of organisation's change management capability?
- TQ3 - What is the level of change resistance in the organisation?
- TQ4 - What is the level of organisation IT portfolio management?
- TQ5 - Is there a champion that drives EA or similar initiatives?
- TQ6 - Does top management provide adequate support to EA or similar initiatives?
- TQ7 - Where is EA positioned in an organisation?
- TQ8 - Who is responsible for EA?
- TQ9 - Is organisation wide communication in place?
- TQ10 - What is the level of inter-stakeholder communication?
- TQ11 - How is new initiatives communicated in organisation?
- TQ12 - Is there a clear goal set for the EA?
- TQ13 - Is there a business case to be solved with EA?
- TQ14 - Is EA related to organisations strategy?
- TQ15 - What are stakeholders expectations and are they conflicting?
- TQ16 - Are expectations in line with stakeholders formal role?

Environment related questions
- TQ17 - Is EA adopted to satisfy external pressure?
- TQ18 - How is EA related to government or similar EAs?
- TQ19 - How EA is coordinated in government level?
- TQ20 - Can EA be forced to be used by government?

Enterprise Architecture related questions
- TQ21 - How is EA framework selected?
- TQ22 - Could selected EA framework used as is?
- TQ23 - Is EA definition too vague?
- TQ24 - Are principles used?
- TQ25 - Is there enough EA skills?

Figure 9: Interview questions (Syynimaa, 2015)

The figure shows a hierarchy with "Interview questions based on theory Syynimaa" branching into three categories:

Organisation related factors
- IQ0: Are there any major change(s) that your organisation has had to deal with in the past few years?
- IQ1: Think about some major change(s) your organisation have faced during the past few years. Describe such a change and how it was conducted. Which challenges, if any, the change faced. Describe the changes and describe the way in which they have taken place.
- IQ2: Describe the process how new information systems are defined, acquired or implemented, and introduced in your organisation.
- IQ3: Describe how new development initiatives are introduced in your organisation. Who or which party is driving such initiatives? How important this is for the success of the initiative
- IQ4: Describe the process how new information systems are defined, acquired or implemented, and introduced in your organisation.
- IQ5: Describe on what basis are development initiatives given resources in your organisation.
- IQ6: Describe how communication is organised in your organisation. How about between external stakeholders?
- IQ7: Explain what your expectations are when using EA for yourself and the organisation. How do they relate to your organisation's strategy
- IQ8: Which kind of expectations from other stakeholders have you faced/know?
- IQ9: In what ways are changes in EA accepted and supported by the various stakeholders in the organisation?

EA related factors
- IQ10: Explain how EA projects relate to programmes of the parent organisations. How are such programmes coordinated? What are the balance of power in such coordination?

Environment related factors
- IQ11: Explain to me how the framework used for EA implementation was selected. Does the framework require any adaptation to meet your purposes? Please explain. What are the principles on which the EA Implementation is based? Explain in your own words EA and related terms.
- IQ12: Could you describe what experience you and your organisation have with EA? Have you been educated or trained on EA? Which parts of EA applied within the organisation have been the most challenging or problematic? Have external specialists been involved in EA implementation?

The table below shows the relationship made by Syynimaa (2015) between the IQs, TQs and the AFs and makes the logical connection between the different elements visible.

As described previously, IQ0 and IQ9 have been added for the benefit of this study. Question IQ0 attempts to gain insight into whether there have been organisational changes that can have a direct effect on the business architecture (functions and processes) and thus have an impact on EA. IQ1 then goes deeper into these changes. IQ9 was added to gain insight into whether EA is seen as a valuable asset or whether people only use it when it suits them. In fact, insight is gained into the state of EA adoption.

#	Organisation related questions	Organisation related questions	Related factors
IQ0	Are there any major change(s) that your organisation has had to deal with in the past few years?	TQ1 : What is organisation's capability to adopt changes?	F1, F2, F3
IQ1	Think about some major change(s) your organisation have faced during the past few years. Describe such a change and how it was conducted. Which challenges, if any, the change faced. Describe the changes and describe the way in which they have taken place.	TQ1 : What is organisation's capability to adopt changes? TQ2 : What is the level of organisation's change management capability? TQ3 : What is the level of change resistance in the organisation?	F4, F8, F10, F11 F2, F8 F10, F13
IQ2	Describe the process how new information systems are defined, acquired or implemented, and introduced in your organisation.	TQ4 : What is the level of organisation IT portfolio management?	F5, F7
IQ3	Describe how new development initiatives are introduced in your organisation. Who or which party is driving such initiatives? How important this is for the success of the initiative?	TQ5 : Is there a champion that drives EA or similar initiatives?	F1, F7, F11, F12, F14
IQ4	Describe on what basis are development initiatives given resources in your organisation.	TQ6 : Does top management provide adequate support to EA or similar initiatives?	F7, F14, F15
IQ5	Describe how EA is organised in your organisation.	TQ7 : Where is EA positioned in an organisation? TQ8 : Who is responsible for EA?	F14, F16 F14, F16
IQ6	Describe how the communication is organized within your organization. What about the communication between business units stakeholders and external stakeholders?	TQ9 : Is organisation wide communication in place? TQ10 : What is the level of inter-stakeholder communication? TQ11 : How is new initiatives communicated in organisation?	F17 F17 F17
IQ7	Explain what your expectations are when using EA for yourself and the organisation. How do they relate to your organisation's strategy?	TQ12 : Is there a clear goal set for EA? TQ13 : Is there a business case to be solved with EA? TQ14 : Is EA related to organisations strategy?	F18 F6, F18 F6, F18
IQ8	Which kind of expectations from other stakeholders have you faced/know?	TQ15 : What are stakeholders' expectations and are they conflicting? TQ16 : Are expectations in line with stakeholders' formal role?	F6, F18 F6, F18
IQ9	In what ways are changes in EA accepted and supported by the various stakeholders in the organisation?	TQ12 : Is there a clear goal set for EA. TQ14 : Is EA related to organisations strategy?	F17, F18 F2, F17, F18
IQ10	Explain how EA projects relate to programmes of the parent organisations. How are such programmes coordinated? What are the balance of power in such coordination?	TQ17 : Is EA adopted to satisfy external pressure? TQ18 : How is EA related to government or similar EAs? TQ19 : How EA is coordinated in government level? TQ20 : Can EA be forced to be used by government?	F23 F24 F24 F23, F25
IQ11	Explain to me how the framework used for EA implementation was selected. Does the framework require any adaptation to meet your purposes? Please explain. What are the principles on which the EA Implementation is based? Explain in your own words EA and related terms.	TQ21 : How is EA framework selected? TQ22 : Could selected EA framework used as is? TQ23 : Is EA definition too vague? TQ24 : Are principles used?	F9, F19 F19 F20 F21
IQ12	Could you describe what experience you and your organisation have with EA? Have you been educated or trained on EA? Which parts of EA applied within the organisation have been the most challenging or problematic? Have external specialists been involved in EA implementation?	TQ25 : Is there enough EA skills?	F22

Table 9: Coherence between Interview Questions, Theoretical Questions, and adoption Factors

4.4 Closed questionnaire

The study also uses a closed questionnaire (CQ) regarding the factors that influence the adoption of EA to gain a better understanding of the factors influencing EAA. The objective is to have more respondents than the number of interviews to be conducted. There is a possibility that the number of respondents will be insufficient to achieve a reliable result. Nevertheless, these additional data is interesting to validate with the analysed result of the SSIs.

The CO has a standard tool called 'Microsoft Office Forms' for questionnaires. Since this tool is familiar to the respondents, it is used to construct the CQ; see Appendix 9 for more details. Another advantage of using 'Microsoft Office Forms' is that all the information remains within the CO intranet and complies with the general data protection regulation. Within the CO, Dutch is the primary language; therefore, the CQ is built in the Dutch language. The questionnaire is derived from the AFs (Figure 7). The CQ was sent to stakeholders via an invitation email (Appendix 8).

4.5 Semi-structured interview

Stakeholders were asked at the end of CQ if they would like to contribute to this study by being involved in an additional interview. The interview questions listed in Figure 9 were used for this purpose. A topic list was prepared to ensure that all questions were covered during the interviews. See Appendix 11 for more details.

4.6 Adjustments made to research methods

During the SA, the operationalisation of the research question and the writing of the CQ, regular discussions took place with the EA expert. The following modifications have been applied:
- The roles of Business Architect and Domain Architect have been merged into the role of Business Domain Architect, see Table 7.
- In consultation with the EA expert, the EA roles were linked to persons approached for the CQ and SSIs.

- The adoption factors F12 ([Figure 7](#)) has been modified to 'EA is more about processes than technology'. This adjustment was made because the architecture of the CO is based on processes.
- IQ0 and IQ9 have been added to the interview questions ([Figure 9](#)).
- With the help of the EA expert, a topic list has also been created to serve as a guide for the interviews, see [Appendix 11](#).

5 Outcomes

This chapter presents an overview of the data collection and the data analysis that has been carried out. To collect the necessary data, an CQ was sent to the selected stakeholders. At the end of the CQ, respondents were asked for their cooperation in a follow-up survey in the format of semi-structured interviews. Unfortunately, after repeated requests, only seven stakeholders completed and returned the CQ. This small number of respondents does not provide a basis for drawing a conclusion or has any informative value for the study. Despite the low response rate, five stakeholders were willing to participate in an interview.

5.1 Explanation of the data collection

5.1.1 Closed questionnaire

Through the CQ sent, stakeholders were asked for their opinion on factors affecting the EAA. The CQ began by checking whether the respondents were familiar with the definition of EA. This check was built in to determine the usefulness of the data obtained. All respondents confirmed that they had sufficient knowledge about and understood the definition of EA. In the CQ, the respondents were asked to indicate, using a Likert scale, to what extent a factor influences the EAA. [Table 10](#) shows in the left column all the factors that influence EAA, and the columns from 'Very negative' up to column 'Do not know' shows per factor to what extent it influences EAA according to the respondents. The numeric values indicate per factor how many respondents chose the measures of influencing EAA.

Results of the closed questionnaire

Factors Influencing EAA	Very negative	Negative	None	Positive	Very positive	Do not know	X respondents
Change management capability				5	2		7
Clear goal set for the EA adoption set by the organisation		1	1	3	1	1	7
Communication	1			2	3	1	7
Conformance in change			4	1		2	7
EA adoption brings cultural clash to surface	1	3		3			7
EA is more about people than technology		2	1	2	1	1	7
Experience and skills of EA staff				2	4	1	7
Importance of leadership				4	1	2	7
Initiator of EA adoption			1	4	1	1	7
Interoperability issues of related Eas		4	1	1		1	7
IT portfolio management				4	2	1	7
Need of change in organisational culture		1		5		1	7
Organisation structure		1	1	1	2	2	7
Organisation's capability to adopt changes		2	4	1			7
Organisational position of EA function	1			3	2	1	7
Resistance to change		5	1	1			7
Selection of the EA framework			1	4	1	1	7
Social perspective is important		1	1	1		4	7
Steering power of external parties			1	3		3	7
Strategy driven change		1		5	1		7
Structured decision making process		1	2	3	1		7
Support of top management	1			2	1	3	7
Use of principles			1	4	1	1	7
Vague definition of EA2		6		1			7
Grand total	4	28	20	65	24	27	

Table 10: Results CQ

When we look, for example, at the factors:
- 'Change management capability',
- 'Need of change in organizational culture',
- 'Strategy drive change',

we see that five respondents believe that these factors have a positive influence on the adoption of EA. As far as the factors:

- 'Need of change in organizational culture',
- 'Strategy drive change',

two respondents rated the influence 'Negative', which is remarkable. This question may have been misunderstood, or he or she may not have enough experience to answer it. It may also be the case, as described by Oreg et al. (2011), that a lack of communication is the cause.

As described earlier, the small number of respondents does not form a basis for drawing conclusions and has no informative value for this study. See Appendix 8 for the CQ invitation letter, Appendix 9 for CQ and Appendix 10 for the CQ result.

5.1.2 Interviews conducted

At the time of this study, the CO was in the process of splitting its joint venture into two separate entities, and there was a pandemic (COVID-19). As a result, the scheduling of interviews with the stakeholders encountered some challenges. Due to the pandemic, the interviews could not be conducted on the CO's premises and had to take place remotely. This was done using Microsoft Teams, which facilitates online meetings and offers a recording option. A total of five interviews were planned and conducted, lasting between 45 and 75 minutes. The interviews were held in the period June/July 2021 and went smoothly. Using Microsoft Teams was not an obstacle at all. All stakeholders were fully cooperative and very enthusiastic, making each interview an enjoyable activity. The interviews began by thanking the participants for their participation and explaining the purpose of the study. Permission was then asked to record the interview and explained that anonymity was guaranteed for all data collected. After this, the interviewees were asked to introduce themselves. All interviews were conducted in the Dutch language. Due to the semi-structured nature of the interviews, a topic list (Appendix 11) was used to cover all IQs. During the interview, IQs were answered in random order.

5.2 Analysing and coding interview data

In preparation for the analysis, the recordings were first transcribed with Amberscript (https://www.amberscript.com/). Unfortunately, Amberscript does not handle the Dutch language very well, and therefore the transcriptions had to be checked and corrected before further use. These corrected transcriptions were then automatically imported into ATLAS.ti (release 9.1.3.0) to internal documents. These documents were then reviewed one by one, and interesting quotations were coded according to Syynimaa's REAP model categories and the 25 AFs.

See for more information about:
- REAP categories used Appendix 5.
- The AFs used in Figure 7.

5.2.1 Description of coding applied

This subsection gives examples of coding in ATLAS.ti based on the REAP model. These examples give insight into the coding process, allowing the internal validity of this study to be assessed.

The examples show the REAP categories and their sub-categories regarding a quotation with an explanatory note.

Read instruction figures 10 to 13 inclusive:
1) REAP category.
2) Subcategory.
3) Coded quotation.
4) Explanation of the quotation.

Taking Figure 10 as an example: The quotation is coded according to the REAP model as cultural in the group 'Objectives (desired changes)'. The figures that follow must be interpreted in the same way.

Coding example of REAP – Objectives (desired changes):

1) REAP - Objectives (desired changes)

is part of

3) 4:47 ¶ 39, Why don't you do it that way and then you actually have to find a way to... in Interview 4

Why don't you do it that way and then you actually have to find a way that people don't say, "I don't have time for this, I don't feel like it, I'm going to do it this way anyway" and that's actually the whole discussion that "our way of working" has brought to the surface. That's a culture thing, like we don't know what we should be doing, because in terms of content we do know, but introducing it smartly and effectively into the organizations is quite difficult at Tata, it just is.

2) REAP_SC - Cultural

4) Explanatory note: Objectives (desired changes)

From way back, there is a culture that work units are independent entities that have their decision powers. This creates the situation that makes EAA difficult if not impossible.

Figure 10: Example of coding applied: REAP - Objectives (desired changes)

Coding example of REAP - Resistance during execution:

REAP - Resistance during execution

is part of

3:57 ¶ 94, What you see is a lot of technically savvy people, a lot of engineers... in Interview 3

What you see is a lot of technically savvy people, a lot of engineers who are very analytical, fact-based. Certainly, the managers. Engineers are not known for their for their empathy empathy human side etc., which is often there don't hear of it, yes, but that's not the primary reaction.

REAP-SC - Other reasons

Explanatory note: REAP - Resistance during execution

This attitude makes it almost impossible to enthuse those below them at EAA.

Figure 11: Example of coding applied: REAP - Resistance during execution

Coding example of REAP - Resistance during planning:

REAP - Resistance during planning

is part of

REAP-SC - Low motivation

3:63 ¶ 44, Costs always go before benefits, but I think to you: why... in Interview 3

Costs always go before benefits, but I think to you: why. Why am I saying this? There is a short-term interest, because apparently it overshadows the long-term interest. What is the benefit from?

Explanatory note: REAP - Resistance during planning

Often, projects are implemented without involving an EA team because it adds extra cost. This causes EA overviews to be inaccurate, losing the overall view of the Enterprise architecture. EA cannot reach a mature state this way.

Figure 12: Example of coding applied: REAP - Resistance during planning

Coding example of REAP - Strategic level of EA:

REAP - Strategic level of EA

is part of

REAP-SC - Enterprise IT Architecti...

1:74 ¶ 42, Look at the organizational changes such as future landscape and the man... in Interview 1

Look at the organizational changes like future landscape and the way we want to do that, that's also a kind of organizational change behind it, so you actually want to standardize your processes say a litt...

Explanatory note - Strategic level of EA

In this quotation, the focus is on standardization of business processes where EA can help.

Figure 13: Example of coding applied: REAP - Strategic level of EA

5.3 Qualitative results based on the REAP model

Below is the result of the qualitative findings on the analysis using the REAP categories. The results, in the tables below, are a summary of the analysis done in ATLAS.ti. For each REAP category, this is an aggregated overview of the associated factors described in Paragraph 5.2.

Read instruction tables 11 to 14 inclusive; When looking at Table 12, the text above the table shows the REAP category. The left column (Code) shows the REAP subcategories, and the right column (Research findings) shows the findings/conclusion of the analysis. The tables that follow should be interpreted in the same manner.

Qualitative results: REAP - Strategic level of EA:

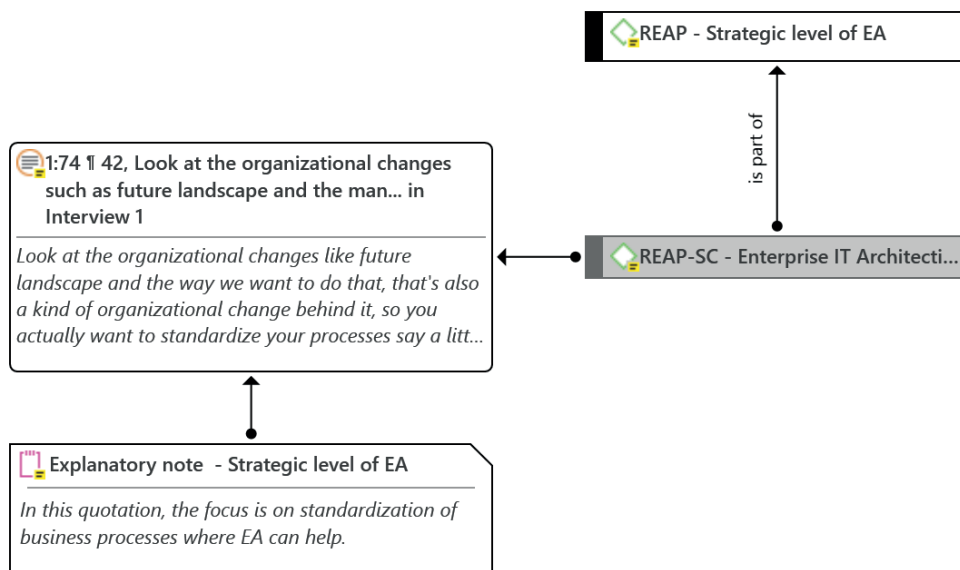| Code	Research findings
Enterprise Ecological Adaptation	• In the context of this research, the finding of the classification 'Enterprise Ecological Adoption' is interpreted as an awareness of the benefits of EA with regard to organisational innovation and sustainability. However, it appears that the current EA teams have not been placed in the right place in the organisational structure.
Enterprise Integrating	• The finding of the classification 'enterprise integrating strategy' indicates that the respondents are aware of the importance of EA for the company. This is not a representation of the strategy that the company is pursuing. • EA initiatives have been found where the focus is mainly on IT systems to define functionality.
Enterprise IT Architecting	• No direct connection can be found as an enabler for the realisation of the business strategy. • Currently, EA activities are still focusing on the efficiency, cost and manageability of the IT landscape environment. EA is still seen as IT related!

Table 11: Qualitative results: REAP - Strategic level of EA

Qualitative results: REAP - Objectives (desired changes):

Code	Research findings
Cultural	• There are traditionally large cultural differences within the CO. One of the causes is how the right of decision is organised within the company.
Structural	• The CO, together with a subsidiary, forms a joint venture and is currently involved in a separation process. Both companies continue as independent entities. The lack of a good overview of the interwovenness of the two organisations complicates this process. • The CO depends on many legacy systems whose knowledge carriers are now not employed by the company.
Political	• There are several force fields at play between business relationship managers, information managers and local IT managers who all have their own autonomy and therefore their own say.
Processes	• The roles and accountabilities should be better aligned. There is currently just some overlap of processes which can lead to lost time due to discussions. • The communication process in EA is not working properly. That is probably the weakness of EA within the CO. In general, EA does not live on the factory floor and with the operation.

Table 12: Qualitative results: REAP - Objectives (desired changes)

Qualitative results: REAP - Resistance during planning:

Code	Research findings
Distorted perception, interpretation barriers and vague strategic priorities	
Perpetuation of ideas	• There is a culture that you should not change work processes that are working well and that, as a result, you may not respond well to new situations. • Several local IT managers are so politically savvy that they will not give up their kingdom and block innovations.
Communication barriers	• The company is struggling to put EA in place due to its corporate structure. • Business units do not see the benefits of EA. • The understanding of EA is mainly in the upper layers of the organisation; communication to the lower layers is almost non-existent. • The top-down communication is not good, which means that the importance of EA is not understood at the bottom of the organisational structure.
Myopia	• It is not clear from the analysis what strategy the company has towards EA. • There is a short-term view of EA that makes it difficult to reach maturity.
Low motivation	
Cannibalisation costs	• The company operates in a fluctuating market, so margins are regularly under pressure, which means there is little money available for EA initiatives. • Cutting back on EA initiatives compromises the achievement of EA maturity.
Different interests among employees and management	• The separation of the joint venture will result in less focus on EA. • There are differences between the various Business Areas regarding the importance of EA. • This is partly because the Business Areas must meet their annual targets.
Lack of creative response	
Fast and complex environmental changes	• The company has an old diverse complex and unmaintainable IT landscape. • The analysis shows that the organisation is confronted with a great variety of rapidly succeeding challenges (market forces) and (desired) changes. • The EA department is experiencing difficulties due to market developments, as budgets are constantly being cut. • The analysis also shows that there is a growing awareness of the importance of EA and it is expected that this will increase the level of acceptance.
Inadequate strategic vision	• The analysis shows that a strategic vision for EA is missing. • There is a department with Enterprise Architects, but they operate as IT architects. Organisationally, the department positioned is within the IT department GIS. • EA is an enabler for the organisation, but it appears that in general, individuals see EA as an IT matters and not as an organisational matter. • EA expectations from the business to stakeholders are not always clear.

Table 13: Qualitative results: REAP - Resistance during planning

Code	Research findings
Other sources	
Leadership inaction	• The top management has sufficient insight into the benefits of EA. However, this is not supported sufficiently, which means that there is a lack of steering towards the lowest levels of the company. • The analysis shows a lack of leadership regard to EA. This is mainly because EA is still seen as an IT-related issue. • EA is mainly communicated top-down by a specific group of mostly EA specialists. • There is virtually no communication with the business units. This makes it difficult to actually get EA on the agenda. One of the reasons for this is the silo approach, whereby business units continue to make their own choices according to their interests and focus. • The use and compliance with standards is not sufficiently enforced. • In order to accept and implement EA holistically, more guidance and explicit sponsorship from senior management is needed.
Embedded routines	• The analysis indicates that the work units often stick to their way of working. For example, work units outsource work to suppliers. The EA department is not involved in this process, which means that the EA overview is incorrect. There are no EA procedures that a business area must adhere to when outsourcing. • The early involvement of EA in the early stages of a project is not yet common practice. • As a result, the reaching of EA maturity is constantly undermined.

Collective action problems	• The collective action problem, according to the analysis, is that:
	  - senior management is aware of the importance of EA,
	  - EA is in the wrong position in the organisational structure,
	  - awareness is necessary by communicating, training and identifying a sponsor for EA.
	• However, no one is taking the lead in this, except for the manager of the EA department, but because the EA department is not positioned correctly in the organisational structure, it has an insufficient mandate.

Capabilities gap	• The analysis indicates sufficient knowledge and experience with EA. • This regards a few employees with an IT background. • Given the scale of the company/work package, there are not enough human resources available.
Political and cultural deadlocks	
Departmental politics	• Each business area works more or less autonomously and has its own goals, which are not necessarily in line with the goals of other business areas. A business area is evaluated on its annual plan. • This autonomy structure means that business areas find it difficult to accept authority from other business areas when their annual plan is threatened. • As a result, the business units do not necessarily see the organisation as a single entity, and there is evidence of silos. • The situation may arise that a business unit, if possible, does not participate in renewal.
Deep rooted values	• There is a culture that if something works well, you should not change or innovate. • This is partly the result of the autonomy of a work unit.

Table 14: Qualitative results: REAP - Resistance during execution

See Paragraph 5.5 for a summary of the research findings listed in the tables above.

5.4 Qualitative results based on the 25 EA adoption factors

The following is a summary of the findings per factor based on the qualitative analysis of each interview for the relevant adoption factor. It represents a consolidated view per adoption factor as a result of the analysis of the interview data. The qualitative results are group by the REAP model categories (tables 15 to 17 inclusive).

Read instruction tables; When looking at Table 15, the text above the table shows the categories and the two left columns (Code) are the factor ID (Fxx) and name. The right column (Research findings) shows the findings/conclusion of the analysis.

Qualitative results: Organisational Factors Influencing EA Adoption:

Code	Research findings
F1 **Organisation structure**	• At the time of this research, a separation of the joint venture was in rogress. Because EA knowledge and resources are divided over the joint venture, the split will result in a loss for both companies. The separation will limit the EA's optimisation, as the companies will continue as independent entities.
F2 **Change management capability**	• Within the case organisation, there are still many legacy systems active that they want to decommission. The EA is essential here because it helps to see connections. Unfortunately, not all of the legacy systems are within the EA. It seems that the organisation has difficulties in involving different stakeholders in these changes.
F3 **Need of change in organisational culture**	• EA will have to become better known throughout the organisation to change the EA culture. By placing EA in a different position in the organisational structure, EA will become more widely known, resulting in it becoming more embedded in the organisational culture.
F4 **Organisation's capability to adopt changes**	• It seems that the organisation has difficulty implementing desired changes. Projects have a longer lead time than expected.
F5 **IT portfolio management**	• There is no uniform pattern here. It varies from ad hoc modifications, building solutions themselves and buying them from of the shelf. Respondents have a different opinion.
F6 **Strategy driven change**	• The CO has no, has hardly any strategy on EA. EA is designed and managed from an IT perspective.
F7 **Structured decision making process**	• It indicates that the CO has difficulty communicating the added value of EA. • Stakeholders are not aware of the importance of EA, which can make them work against it. • There is a lack of a sponsor at the senior management level to reinforce the importance of EA.
F8 **Conformance in change**	• Although there is a standardised process for realising projects, business unit interests often drive decisions and choices with insufficient attention to the overall picture.
F9 **EA frameworks' lack of focus on social perspective**	• Senior management has an important role in EA adoption. They have the challenge with the current EA framework to get EA adopted through all layers of the organisation.
F10 **EA adoption brings cultural clash to surface**	• There is a difference in perception and freedom of action due to different interests. EA is not seen as an organisation-wide interest, which is a basis for mutual disagreement or conflict.
F11 **Social perspective is important**	• Because of their experience and work patterns, employees do not see the need for change. A common remark is; Everything works anyway; why would we change it.
F12 **EA is more about processes than technology**	• In the case of the CO, EA should be about the entire process model. The EA architects are aware of this, but EA is often still seen as IT technology in the organisation.
F13 **Resistance to change**	• Analysis shows that resistance mainly occurs due to a potentially incorrect or limited view of EA and the added value it can bring. This is primarily due to the freedom of operation and the different targets set by the business units. This does not seem to be the case with the Future Landscape project. In this initiative, working groups were formed from the business, which sparred together to develop ideas. Despite this approach, there was still resistance to final making choices.
F14 **Importance of leadership**	• There seems to be a lack of leadership regarding the importance of EA and enforcing compliance with EA. The business units do not feel compelled to work with EA.
F15 **Support of top management**	• Senior management does not provide enough leadership to sponsor EA, which does not encourage EA adoption.
F16 **Organisational position of EA function**	• The EA function within CO is positioned within IT. EA is still seen as IT-related. There is no embedding at the level of senior management.
F17 **Communication**	• The CO has difficulty communicating across 13 business units. EA information does not reach the lower levels of the organisation. Relevant stakeholders are often not aware of EA. • There is an absence of sponsorship from the senior management to power the message.
F18 **Clear goal set for the EA adoption set by the organisation**	• EA development initiatives are initiated more from within EA itself as well as the measurements to assess success. There is no business case for promoting EA adoption.

Table 15: Qualitative results: Organisational Factors Influencing EA Adoption

Qualitative results: EA Related Factors Influencing EA Adoption:

	Code	Research findings
F19	**Selection of the EA framework**	• The CO uses available market standards when it comes to frameworks and tooling.
F20	**Vague definition of EA**	• The analysis shows that respondents have a clear idea of what EA is. However, the lower you get in the organisational structure, the less clear and unambiguous the picture of what EA actually is and what its added value can be for the organisation. • Communication through the organisational structure seems insufficient to make EA widely known.
F21	**Use of principles**	• The formal guiding principles regarding the definition and set-up of EA are known to the CO. In the past, the design of EA was carried out with the help of external agencies.
F22	**Experience and skills of EA staff**	• The analysis shows that there is too little knowledge or enough people within the organisation who can support EA to increase adoption. Only a limited number of people have the right knowledge. These people have acquired the knowledge by learning on the job, after which they have obtained the required EA certificates.

Table 16: Qualitative results: EA Related Factors Influencing EA Adoption

Qualitative results: Environmental Factors Influencing EA Adoption:

	Code	Research findings
F23	**Initiator of EA adoption**	• The analysis shows that the EA department itself is the initiator of EA initiatives. These initiatives are not part of senior management's vision. • It seems that the standard project approach within the CO can ensure that initiatives, including EA, go ahead regardless of the initiator.
F24	**Interoperability issues of related EAs**	• In the adoption of EA, there seem to be interoperability issues between different business areas (EAs) that should work together. The fact that each business area has its own authority prevents it from working together without restrictions.
F25	**Steering power of external parties**	• About 13 years ago, the CO did not have sufficient knowledge about EA. At that time, it was chosen to hire external expertise to help with the initial set-up of EA. • An indirect influence on EA is possible from changes in laws and regulations to be compliance.

Table 17: Qualitative results: Environmental Factors Influencing EA Adoption

See for a summary of the research findings listed in the tables above.

5.5 Summary qualitative analysis

REAP - Strategic level of EA:

On the strategic level, senior management is aware of EA. However, they fail to put the EA department in the correct position within the organisational structure. In the current situation, the EA department is part of the Global Information Systems (GIS) department, and therefore still seen as IT-related. Consequently, it is not surprising that today's EA activities at the CO still focus on the IT landscapes, efficiency, cost, and manageability.

REAP - Objectives (desired changes):

In terms of the objectives for EA, the analysis reveals issues. The CO has many legacy systems of which the knowledge is no longer available. Traditionally, cultural differences have evolved within the CO. The autonomous decision-making of the business units may be the reason for this. Each business unit functions as an independently operating entity with its annual plans. It is also visible that each business area has its own IT and information managers who mainly represent the interests of the business area. Responsibilities may need to be better aligned, and communication throughout the production chain improved.

REAP - Resistance during planning:

In terms of resistance during planning, the analysis did not clarify the CO's strategy towards EA. Whenever there is less cash flow due to a market downturn, the production of products will be prioritised to create more revenue and compensate for the market downturn. Consequently, the CO may be missing out on opportunities to perform better within their fluctuating market segment. This fluctuation makes it difficult for EA to achieve maturity. The additional problem is that business units do not see the benefits of EA. The understanding of EA is mainly in the upper layers of the organisation. Communication to the lower layers is almost non-existent. Good top-down communication is essential to create awareness in the lower layers of the organisation. At the time of the investigation, the CO was involved in a split-up of the joint venture with its English subsidiary. In the joint venture, the EA architects were divided between the subsidiaries. As a result of the split, the number of EA architects will decrease in both subsidiaries, which will not benefit EA.

REAP - Resistance during execution:

In terms of resistance during execution, it is not clear what strategy the CO has regarding EA. Since the EA department is not in the correct place within the corporate structure, it is challenging to introduce EA across the CO. Here it is important to communicate more about EA and to convince people of its added value. Due to ignorance, EA is not involved in innovation projects or is applied too late. The analysis shows a growing awareness of the importance of EA. The acceptance rate is expected to increase, but this will not be enough to achieve more results shortly, given the company's size. The analysis also shows that the business units stick to their working methods. Due to ignorance, political reasons or clinging to old ways of working, the EA department is often not initially involved in changes, resulting in an inaccurate holistic view, and reaching EA maturity is constantly undermined. The analysis shows that there is knowledge and experience with EA. This mainly concerns a small group of employees with an IT background. Given the size of the company and the amount of work, there are not enough employees available for the EA department. As mentioned earlier, the business units operate autonomously, and each has its accountability concerning the achievement of the annual plan. As a result, the business units do not necessarily see the organisation as a single entity and operate in silos. There is a culture that if something works well, you should not change or innovate. This way of thinking can cause innovations to be either not supported by the business unit or rejected.

25 EA adoption factors:

The scores in Table 15, Table 16, and Table 17 indicate that all 25 factors were discussed during the interviews. Factors F7 (Structured decision-making process) and F11 (Social perspective is important) both came up in only one interview and are therefore not representative for analysis.

The analysis of the data shows that the following factors score high:
1. Organisation related factors:
   - F3(Need of change in organisational culture),
   - F16(Organisational position of EA function),
   - F17(Communication),
2. EA related factors:
   - F21 (Use of principles),
3. Environment related factors:
   - F24 (Interoperability issues of related EAs).

Looking at the adoption factors, we can conclude that:
- The EA department is not in the right place in the organisational structure. This is caused by the fact that EA is still considered IT-related.
- Relevant stakeholders outside the EA department are often not aware of EA.

- Communication through organisational layers is not sufficient. A lack of communication during the process of change can be a major source of difficulties for change during the implementation of EA (Oreg et al., 2011).
- The EA-related factors indicate that a uniform line can be found with respect to principles and the use of frameworks or standards. This gives a misleading picture as all interviewees are familiar with EA. When a larger group of people is interviewed, these findings can turn out to be the opposite.
- The environment-related factors indicate that there are interoperability issues. This can be traced back to the independent operating of the business units. The fact that each business area has its authority hinders cooperation. A consequence of this is a lack of communication and resistance to change.

6 Conclusions, discussion and recommendations, and reflection

This chapter contains a discussion of this research, the research method, and the results. In addition, recommendations are made for further practice and study. The last part of this chapter is a reflection on the experiences during the study.

6.1 Conclusions

The manufacturing industry is undergoing major changes, such as the transition from Industry 3.0 to 4.0 and minimising the carbon footprint and pollution. Here can EA be the essential instrument to keep the changes manageable and maintainable (Boh & Yellin, 2006; Goerzig & Bauernhansl, 2018). When implementing EA and reaching maturity, the adoption is of great importance. This study examines the factors related to adopting EA based on existing findings.

Understanding which factors influence the adoption of EA within the MI requires answering the main research question:

Which factors related to adopting EA are important when introducing it in the MI?

Based on the research result, we can conclude the following:
- The data analysis reveals that the respondents can position and explain EA within a broader context.
- Through the organization, there is insufficient knowledge about the benefits of EA.
- There is a culture among the business units that what functions should be left as it is.
- EA is still seen as IT-related and not as something that concerns the entire organisation. EA involves the entire organisation and is not just IT-related (Scholtz et al., 2013).
- All 25 AFs defined by Syynimaa (2015) were discussed during the interviews and could be classified by Syynimaa's research.
- The EA department does not have the appropriate place in the organisational structure. As a result, there is not enough mandate to achieve EA maturity.
- The organisation related factors: F3 (Need of change in organisational culture), F16 (Organisational position of EA function), F17 (Communication), are most influencing EAA. Regarding the environmental factors, F23 (Initiator of EA adoption), the EA department is the initiator and not senior management. As a result, the EA mandate is lacking. Regarding F24 (Interoperability issues of related EAs) indicates an interoperability issue between the different business units. This may be caused by the business unit autonomy.
- Awareness of the benefits EA must grow. More stakeholders are needed with knowledge related to EA.
- EA need sufficient mandate and be fully embedded in the organisation, for this senior management must support EA (Syynimaa, 2015).

The overall conclusion is that despite Syynimaa's research took place in another domain (Higher Education in Finland), the results of this research show that his REAP model is also applicable in the domain of the MI for identifying factors of resistance in adopting EA. When these factors are identified, Syynimaa's EA-adoption Method (EAAM) can then be applied to overcome the factors of resistance and to helps senior management to get the required mandate.

When EA has reached maturity, EA can act as a catalyst in the transition to Industry 4.0. This proposition is supported by the theories of Boh and Yellin (2006) that EA can be the essential instrument to keep changes manageable and maintainable and by the theory of Ahlemann et al. (2012) that EA ensures that business changes can be implemented quickly and easily.

Syynimaa's research concludes that most EAA problems are caused by misunderstood EA concepts, resistance to change and a lack of the necessary skills. These problems were also found in this study and support his theory.

As this study builds on Syynimaa (2015) REAP model, there is a chance that other perspectives on EA adoption have not been considered. Therefore, this study does not claim to be complete in terms of EA adoption factors. Due to the time limitation of this study, EAAM of Syynimaa (2015) was left out of the scope in this study, but it is referred to a few times.

6.2 Discussion

EA adoption is mainly related to the changes in a company (Syynimaa, 2015). This research aims to increase the understanding of which factors influence the adoption of EA within the MI, and for that matter, the AS-IS and the TO-BE state of EA at the CO were researched to gain insight into the existing EA. Below are the discussion points related to this research.

Operationalisation of the research objectives:

The operationalisation of the research objectives (Paragraph 4.3) is based on the previously conducted literature review to set up the conceptual model (Figure 4). Syynimaa's REAP model was used to make research data measurable. Given the limited duration of the study, the choice of data collection through SSIs proved to be the right one. The respondents were all enthusiastic about sharing information for the benefit of the research. On the other hand, the number of participants in the CQ (Paragraph 4.4) was disappointing and, therefore, not used in the discussion.

Construct validity:

The steps detailed in Paragraph 3.4.1 are followed to ensure the construct validity. The design and operationalisation of this research (Paragraph 4.3) have been evaluated with an EA expert. In this process, some changes were made to the operationalisation of the research, see Paragraph 4.6. In accordance with the plan, the results of this research were matched with the empirical research, which is based on existing scientific research. The researcher emphasised that during the interviews, the questions were presented in an objective manner. This gave respondents the opportunity to think and be creative in formulating their answers. This limited the bias in the answers.

Internal validity:

For internal validity, this study mainly used existing literature, peer-reviewed articles that matched the research questions and were used as measurements to test the theory; see Paragraph 3.4.3 for more details. The stakeholders, those responsible for EA-related decisions, as well as those who have to put it into practice and are involved in EA initiatives, are selected according to the selection criteria of Berg and Steenbergen (2004). The classification of the stakeholders chosen is done according to the criteria of Mitchell et al. (1997); see Paragraph 4.2.2 for more detail.

The chosen research strategy means that the degree of generalisability is limited. The research aims to enhance the understanding of EAA and gain insight into which adoption methods influence future developments from the perspective of organisational change within the MI. The stakeholders were selected according to the procedure described above and with the assistance of the EA expert. Due to his involvement, the EA expert was left out of the study. This selection can be seen as a random sample within the higher layers of the organisation. Selecting a larger group of stakeholders through all layers of the organisation, which could increase the reliability of the research, was not possible due to the limited lead time of this study. The acquired data is validated using Syynimaa (2015) REAP model and his develop 25 AFs.

Ethical aspects:
Five stakeholders have cooperated in the collection of data through SSIs. Before an interview started, ethical aspects were explained following the steps described in Paragraph 3.4.6. No stakeholders had objected to the interview being conducted.

6.3 Recommendations for practice

To further implement EA, it is essential that the EA department is in the correct position within the organizational structure to get more decision-making power regarding EA. Given the joint venture split resulting in employee reductions, additional EA employees must be recruited. It is advisable to create more awareness throughout the entire organizational structure regarding EA. Currently, there seems to be insufficient knowledge and understanding among the business units to see the benefits of EA. Without support from the business units, resistance to the EAA will continue. Senior management must choose a clear vision and strategy regarding EA and communicate it throughout the organization layers. When people are more aware of the benefits of EA, it is expected that there will be more adoption of EA. Given that the business units can initiate projects independently, it is essential for senior management to present a strategy in which EA should be involved in projects from the very beginning. It is recommended that the CO provide information and training to employees.

6.4 Recommendations for further research

It is possible that this research also can be applied to other companies operating in the MI. The results of this study should not be generalized, as it is focused on only the CO, and a relatively small number of stakeholders were interviewed. Regarding future research, it is advisable to select stakeholders from all levels in the organization to collect data. Another recommendation is to carry out this study outside the scope of the CO (Steel & Mining) but within the MI. By applying this diversity, a broader picture can be formed for the MRQ.

6.5 Reflection

I have experienced conducting this research at the CO (the researcher's employer) as very intense and educational. Unfortunately, the study was delayed due to family circumstances, the COVID-19 pandemic, and the joint venture split into two separate companies. This separation involved the EA Expert (EAE) and many stakeholders. Given the high workload of the stakeholders, it was challenging to schedule appointments. The EAE (Business Domain Architect at the CO), who assisted me with the SA, setting up the CQ and the interview questions, had only time for a meeting once every two weeks due to his busy schedule. Despite this, I have experienced the cooperation with the EAE as very positive and instructive! Participation in the CQ was disappointing. Many stakeholders were approached to participate in the study by filling in CQ. Unfortunately, only seven completed the CQ. Of this number, five stakeholders were willing to participate in an additional interview. Conducting the interviews was a learning experience for the researcher. As the interviews progressed, confidence grew. Using a topic list as a guide helped to ensure that all questions were answered. The respondents were all familiar with EA and very enthusiastic about speaking about it.

The tool Amberscript is used to transcribe the recordings. Unfortunately, Amberscript does not handle the Dutch language very well, and therefore the transcriptions had to be checked and corrected before further use. This took a lot of extra time and caused delays.

The coding process for the analysis was more difficult than expected. Initially, many codes were assigned to one quote in the transcripts. After refining the coding, it became easier to see connections and to arrive at analysis results. Within this process, the transcripts were gone through several times. During the analysis, it became clear that sometimes no further questions were asked during the interviews or a previously given answer was not returned. The opportunity to gain additional insights may have been neglected as a result. Because the researcher works at the CO and is familiar with the CO and the interviewees, the researcher may have been unwittingly directing.

Despite some setbacks, this research has been a very informative and enjoyable journey. It has provided the researcher with substantive insights and the opportunity to review the EA from a day-to-day perspective with stakeholders within the CO.

The researcher would like to thank everyone for their contributions that made this study possible.

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Appendix 1: The Evolution of the manufacturing industry

Industry 1.0
In the 1800s, water and steam engines were developed to help workers. As production opportunities increased, small businesses that only produced products for their own needs and those of their neighbours grew into large organisations with owners, managers and employees who could supply a growing group of customers.

Industry 2.0
By the beginning of the 19th century, electricity became the primary source of power. It was easier to use than water and steam and enabled businesses to concentrate power sources on individual machines. Eventually, machines were designed with their power sources, making them more portable. This period also experienced the development of several management programs that made it possible to increase the efficiency and effectiveness of manufacturing facilities. Division of labour, where each worker does a part of the total job, increased productivity. Mass production of goods using assembly lines became common practice. American mechanical engineer Frederick Taylor introduced approaches of studying jobs to optimize worker and workplace methods. Lastly, just-in-time and lean manufacturing principles further refined how manufacturing companies could improve their quality and output.

Industry 3.0
The third evolution began in the '70s of the 20th century with the invention of the transistor and the computer chip with integrated circuits. This made it possible to automate individual machines more as an addition to or as a replacement for the operators. This period also spawned the development of software systems to capitalize on electronic hardware. Integrated systems, such as material requirements planning, were superseded by enterprise resources planning tools that enabled humans to plan, schedule and track product flow through the factory. The pressure to reduce costs caused many manufacturers to move component and assembly operations to low-cost countries. The extended geographic dispersion resulted in the formalization of the concept of supply chain management.

Industry 4.0
In the 21st century, Industry 4.0 connects machines and devices to the internet of things (IoT) to enable systems to share information to analyse it and use it to guide intelligent actions. It also incorporates cutting-edge technologies, including additive manufacturing, robotics, artificial intelligence and other cognitive technologies, advanced materials, and augmented reality, according to the article "Industry 4.0 and Manufacturing Ecosystems" by Deloitte University Press.
The development of new technology has been a primary driver of the movement to Industry 4.0. Some of the programs first developed during the later stages of the 20th century, such as manufacturing execution systems, shop floor control and product life cycle management, were farsighted concepts that lacked the technology needed to make their complete implementation possible. Now, Industry 4.0 can help these programs reach their full potential.

Source: Crandell (2017).

Appendix 2: Search result

Listing of the websites used for theory construction and to answer the research questions:

	Title	Year	Author(s)	URL
1	Industry 1.0 to 4.0: the Evolution of Smart Factories.	2017	Crandell, R. E.	http://www.apics.org/apics-for-individuals/apics-magazine-home/magazine-detail-page/2017/09/20/industry-1.0-to-4.0-the-evolution-of-smart-factories
2	Interrogating Texts: 6 Reading Habits to Develop in Your First Year at Harvard.	2020	Gilroy, S.	https://guides.library.harvard.edu/sixreadinghabits
3	Definition of the Manufacturing Industry.	2018	Levinson, C	https://bizfluent.com/facts-6853113-definition-manufacturing-industry.html

Listing of the articles selected for theory construction and to answer the research questions:

	Title	Year	Author(s)	Cited by	URL
1	Information technology for manufacturing: reducing costs and expanding capabilities: CRC Press.	2016	Ake, K.; Clemons, J.; Cubine, M.; Lilly, B.		https://scholar.google.co.uk/scholar?q=Information+I
2	The impact of purchasing strategy-structure (mis)fit on purchasing cost and innovation performance.	2018	Akın Ateş, M.; van Raaij, E. M.; Wynstra, F.	38	https://www.sciencedirect.com/science/article/pii/S14
3	Architecture for Small and Medium-Sized Enterprises: A Starting Point for Bringing EA to SMEs, Based on Adoption Models. In Information S	2014	Bernaert, M.; Poels, G.; Snoeck, M.; De Backer, M.	31	https://doi.org/10.1007/978-3-642-38244-4
4	Using Enterprise Architecture Standards in Managing Information Technology.	2006	Boh, W. F.; & Yellin, D.	327	https://www.tandfonline.com/doi/abs/10.2753/MIS074
5	The Contribution of Enterprise Architecture to the Achievement of Organizational Goals: A Review of the Evidence	2010	Boucharas, V.; van Steenbergen, M.; Jansen, S.; Brinkkemper, S.	63	https://link.springer.com/chapter/10.1007/978-3-642-
6	Enterprise architecture, IT effectiveness and the mediating role of IT alignment in US hospitals.	2012	Bradley, R. V.; Pratt, R. M.; Byrd, T. A.; Outlay, C. N.; Wynn, J.; Donald E.	205	https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-
7	What to do when Stakeholders matter. Stakeholder Identification and Analysis Techniques	2004	Bryson, J. M.	1799	https://www.tandfonline.com/doi/abs/10.1080/147190
8	Process innovation: reengineering work through information technology: Harvard Business Press.	2013	Davenport, T. H.	4	https://scholar.google.com/scholar?hl=nl&as_sdt=0
9	Systematic combining: an abductive approach to case research	2002	Dubois, A.; Gadde, L.-E.	4449	https://www.sciencedirect.com/science/article/pii/S01
10	Building theories from case study research.	1989	Eisenhardt, K. M.	5000+	https://journals.aom.org/doi/abs/10.5465/AMR.1989.4
11	Theory building from cases: Opportunities and challenges.	2007	Eisenhardt, K. M.; Graebner, M. E.	5000+	https://journals.aom.org/doi/abs/10.5465/AMJ.2007.2
12	The organizational impact of enterprise architecture: a research framework.	2011	Espinosa, J. A.; Boh, W. F.; DeLone, W.	6	https://ieeexplore.ieee.org/document/5718919
13	A theory building study of enterprise architecture practices and benefits.	2016	Foorthuis, R.; van Steenbergen, M.; Brinkkemper, S.; Bruls, W. A. G.	70	A theory building study of enterprise architecture
14	Stakeholder management: A stakeholder approach	2010	Freeman, R. E.	5000+	https://books.google.com/books?hl=nl&lr=&id=NpmA
15	A New Approach to CSR: Company Stakeholder Responsibility.	2006	Freeman, R. E.; Velamuri, S. R.	401	https://link.springer.com/chapter/10.1057/978023059
16	Conceptualizing Resistance.	2004	Hollander, J. A.; Einwohner, R. L.	872	https://link.springer.com/content/pdf/10.1007/s11206-
17	Enterprise Architecting: Critical Problems.	2005	Kaisler, S. H.; Armour, F.; Valivullah, M.	352	https://ieeexplore.ieee.org/abstract/document/138569
18	Designing enterprise it Architectures to optimize Flexibility AnD stAnDArDizAtion in global business.	2010	Kettinger, W. J.; Marchand, D. A.; Davis, J. M.	46	https://search.ebscohost.com/login.aspx?direct=true&
19	The History of Enterprise Architecture	2016	Kotusev, S.	44	https://www.academia.edu/download/57167250/The_
20	Consolidating Enterprise Architecture Management Research.	2015	Kotusev, S.; Singh, M.; Storey, I.	28	https://ieeexplore.ieee.org/abstract/document/707030
21	On applying the theory of structuration in enterprise architecture design.	2010	Mezzanotte Sr, D. M.; Dehlinger, J.; Chakraborty, S.	19	https://ieeexplore.ieee.org/abstract/document/559124
22	Understanding the Value of Enterprise Architecture for Organizations	2012	Nassiff, E.	8	http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=
23	From enterprise architecture to IT governance	2006	Niemann, K. D.	223	https://link.springer.com/content/pdf/10.1007/978-3-
24	Enterprise architecture benefits: Perceptions from literature and practice.	2008	Niemi, E.	96	https://jyx2.jyu.fi/handle/123456789/41370
25	The Benefits of Enterprise Architecture in Organizational Transformation. Business & Information Systems Engineering.	2019	Niemi, E. & Pekkola, S.	4	https://link.springer.com/content/pdf/10.1007/s12599-
26	Enterprise integration and interoperability in manufacturing systems	2008	Panetto, H.; Molina, A.	321	https://www.sciencedirect.com/science/article/pii/S01
27	Enterprise Architecture.	2019	Perez-Castillo, R.; Ruiz, F.; Piattini, M.; Ebert, C.	1	https://ieeexplore.ieee.org/abstract/document/873815
28	Enterprise Architecture Coming of Age: Increasing the Performance of an Emerging Discipline	2011	Raadt, B.	21	https://pdfs.semanticscholar.org/0512/587c1ce0ad4c
29	Regulation Based Linking of Strategic Goals and Business Processes.	2002	Regev, G. & Wegmann, A.	21	https://infoscience.epfl.ch/record/458
30	Entering a dialogue: Positioning case study findings towards theory.	2014	Ridder, H. G.; Hoon, C.; McCandless Baluch, A.	107	https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-
31	An analysis of the adoption and Usage of Enterprise Architecture.	2012	Scholtz, B.; Calitz, A.; Connolley, A.	14	https://ieeexplore.ieee.org/abstract/document/669008
32	How Big Old Companies Navigate Digital Transformation.	2017	Sebastian, I. M.; Ross, J. W.; Beath, C.; Mocker, M.; Moloney, K. G.; Fonstad, N.O.	216	https://publikationen.reutlingen-
33	From problems to critical success factors of enterprise architecture adoption.	2014	Seppänen, V.	19	https://jyx.jyu.fi/bitstream/handle/123456789/44513/1/
34	Achieving benefits with enterprise architecture.	2018	Shanks, G.; Gloet, M; Asadi Someh, I.; Frampton, K.; Tamm, T.	42	https://www.sciencedirect.com/science/article/pii/S09
35	An Exploration of Enterprise Architecture Research.	2013	Simon, D.; Fischbach, K.; Schoder, D.	210	http://centaur.reading.ac.uk/41938/
36	Enterprise Architecture adoption method for Higher Education Institutions.	2015	Syynimaa, N.	17	http://centaur.reading.ac.uk/41938/
37	Modelling the Resistance of Enterprise Architecture Adoption - Linking Strategic Level of Enterprise Architecture to Organisational Changes	2015	Syynimaa, N.	2	https://dl.acm.org/citation.cfm?id=2981296
38	Modeling the Dynamics of Enterprise Architecture Adoption Process.	2015	Syynimaa, N.	11	https://link.springer.com/chapter/10.1007/978-3-319-
39	How does enterprise architecture add value to organisations?	2011	Tamm, T.; Seddon, P. B.; Shanks, G.; Reynolds, P.	371	https://aisel.aisnet.org/cais/vol28/iss1/10/
40	Towards the development of the framework for inter sensing enterprise architecture.	2014	Vargas, A.; Cuenca, L.; Boza, A.; Sacala, I.; Moisescu, M.	57	https://link.springer.com/content/pdf/10.1007/s10845-
41	How Enterprise Architecture Formative Critical Success Facets Might Affect Enterprise Architecture Success	2013	Wan, H.; Luo, A.; Luo, X.	7	https://link.springer.com/chapter/10.1007/978-3-642-
42	Enterprise Systems: State-of-the-Art and Future Trends.	2013	Weiss, S.; Aier, S.; Winter, R.	87	https://www.alexandria.unisg.ch/id/eprint/228135
43	Enterprise Systems: State-of-the-Art and Future Trends.	2011	Xu, L. D.	600	https://ieeexplore.ieee.org/abstract/document/601169
44	Industry 4.0: state of the art and future trends.	2018	Xu, L. D.; Xu, E. L.; Li, L.	607	43.2018.1444806

Listing of the books used for theory construction and to answer the research questions:

	Title	Year	Author(s)	ISBN
1	Strastegic Eneterprise Architecture Management.	2012	Ahlemann, F.; Stettiner, E.; Messerschmidt, M.; Legner, C.	9783642443800
2	Research methods for business students 7th edition.	2016	Saunders, M.; Lewis, P.; Thornhill, A.	9781292016627
3	Enterprise Architecture as Strategy — Creating a Foundation for Business Execution.	2006	Ross, J.; Weill, P.; Robertson, D.	9781591398394
4	Het ontwerpen van een onderzoek.	2007	Verschuren, P. J. M.; Doorewaard, J. A. C. M.	9789462365070
5	Praktijgericht kwalitatief onderzoek	2019	Doorewaard, J.A.C.M.; Kil, A.; Van Der Ven, A.	9789024425921
6	Workbook Business Processes. Open University of the Netherlands (the OUNL) Faculty of Managemen	2015	Martin, H. H.; Kusters, R. J.; Cuijpers, L.	N/A
7	Case study research: Design and methods	2014	Yin, R.	9781452242569

All search results in excel (Double click to open):

Search results and
selection articles.xls:

Appendix 3: EA's different insights

A brief list of different insights into EA:

- EA can be seen to define the current and desirable future states of a company's business processes, capabilities, application systems, data, and IT infrastructure and provides a roadmap for achieving this goal from the current state (Ross et al., 2006; Tamm et al., 2011; Zachman, 1987).
- According (Vargas, Cuenca, Boza, Sacala, & Moisescu, 2014), EA is described as appropriate concepts, methods, models, and tools to be provided to facilitate the alignment and integration of business IT.
- (S. Kotusev, Singh, & Storey, 2015) describe EA as a description of the enterprise from an integrated business and IT perspective.
- According to the perception of van der Raadt (2011) and Tamm et al. (2011), EA is an established planning and governance approach used to help organizations manage complexity and constant change and to align their resources towards a common goal.
- Ake, Clemons, Cubine, and Lilly (2016) and Davenport (2013) describe EA as the ability to use information technology (IT) which is an important determinant of the performance of manufacturing companies.
- EA is the definition and representation of a high-level view of an enterprise's business processes and IT systems, their interrelationships, and the extent to which these processes and systems are shared by different parts of the enterprise (Tamm et al., 2011).
- Etc.

Appendix 4: Stakeholder Analysis

The data collection will take place by interviewing EA stakeholders within the case organization. By means of a stakeholder analysis, it will be determined which person can provide relevant information. Freeman (1984) defines a stakeholder as 'any group or individual who can influence or is influenced by the achievement of the objectives of the organization'. The term "organization's objectives" is replaced by the EA. As part of the stakeholder analysis, Bryson's primary technique is used. This involves the following steps (Bryson, 2004; Martin, Kusters, & Cuijpers, 2015):

- Brainstorm the list of potential stakeholders.
- Make a separate flipchart for each stakeholder.
- Place a stakeholder name at the top of each sheet.
- Create a narrow column on the right side of each sheet and leave the column empty.
- For each stakeholder, in the area to the left of the narrow column, provide a list of the criteria that the stakeholder would use to assess the performance of the organization (or to make a list of what the stakeholder expects from the organization (or what the expectations of the stakeholder are of the organization).
- Decide how well you think the stakeholder thinks the organization is doing from the stakeholder point of view. Use coloured dots to indicate a stakeholder opinion of good (green), fair (yellow), or poor (red).
- Identify and record how each stakeholder can be quickly satisfied.
- Identifying and recording longer-term problems with individual stakeholders and stakeholder groups.

Additional steps that may still be included:

- Specify how each stakeholder influences the organization.
- Determine what the organization needs from each stakeholder.
- Rank the stakeholders according to their importance to the organization, considering the:
  1. Power (to influence the firm),
  2. Legitimacy (of the stakeholders' relationships with the firm),
  3. Urgency (of the stakeholders claim on the firm),

of the stakeholders (Mitchell et al., 1997) (Table1, Figure 1).

Class of Stakeholder		Attribute(s)	Level of Salience
Definitive Stakeholders	**Definitive**	Power, legitimacy and urgency	High
Expectant Stakeholders	**Dependent**	Legitimacy and urgency	Moderate
	Dangerous	Power and urgency	Moderate
	Dominant	Power and legitimacy	Moderate
Latent Stakeholders	**Demanding**	Urgency	Low
	Discretionary	Legitimacy and urgency	Low
	Dormant	Power	Low

Table 1: Stakeholder salience framework (Mitchell et al., 1997)
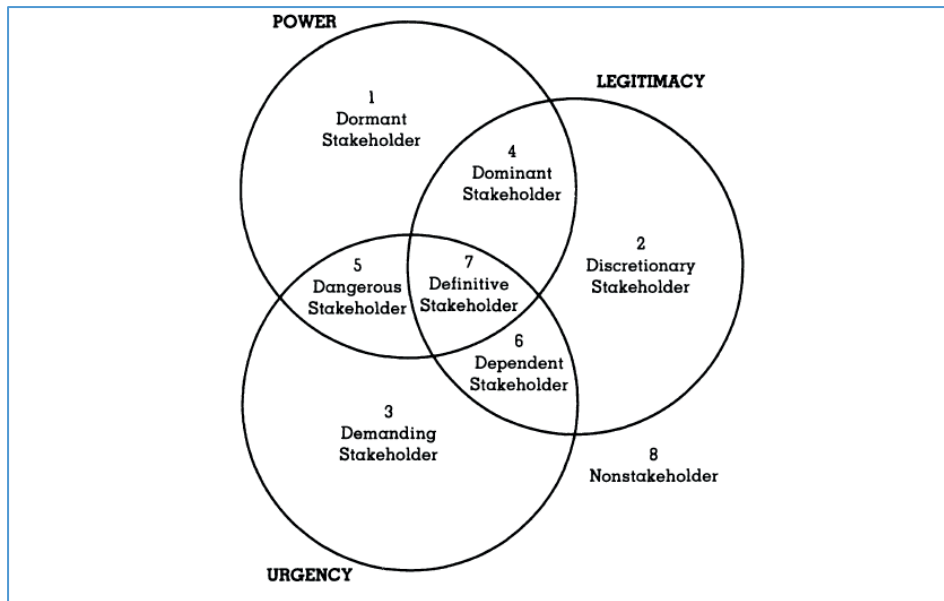
Figure 1: Stakeholder typology (Mitchell, Agle, & Wood, 1997)

Finally, it is important to make a ranking among all identified stakeholders. Mitchell et al. (1997) have developed a stakeholder ranking method for this purpose. At its core, it is based on a stakeholder classification in which classes are formed as a function of authority, legitimacy, and urgency. The different combinations of the above three classifications result in seven stakeholder classes. Stakeholder classes as described by the salience model (Wikidot.com, 2007):

1. *Discretionary stakeholders*:
   These stakeholders have little urgency or power and are unlikely to exert much pressure. They have legitimate claims.

2. *Dormant stakeholders*:
   These stakeholders have much power but no legitimacy or urgency and therefore are not likely to become heavily involved.

3. *Demanding stakeholders*:
   These stakeholders have little power or legitimacy but can make much "noise" because they want things to be addressed immediately.

4. *Dominant stakeholders*:
   These stakeholders have both formal power and legitimacy but little urgency. They tend to have certain expectations that must be met.

5. *Dangerous stakeholders*:
   These stakeholders have power and urgency but are not pertinent to the project.

6. *Dependent stakeholders*: These stakeholders have urgent and legitimate stakes in the project but little power.
   These stakeholders may lean on another stakeholder group to have their voices heard.

7. *Definitive stakeholders*:
   These stakeholders have power, legitimacy and urgency and therefore have the highest salience.

8. *Non-stakeholders*:
   These stakeholders have no power, legitimacy or urgency.

Appendix 5: REAP of Syynimaa

The REAP model introduces previously unexplored relationships between the strategic level of EA and desired organisational changes. Moreover, it captures the influence of the desired changes to the resistance and resulting changes. Therefore it can be argued that the REAP model increases the understanding of issues affecting EA adoption (Syynimaa, 2015). The REAP model comprises the following four categories (Figure 1) and uses the category of change type described by Cao, Clarke, and Lehaney (2003). Summary of the four categories:

1. Strategic level of Enterprise Architecture Lapalme (2012), see Table 1 for more details:
   a. Enterprise Ecological Adaptation: EA is the means for organizational innovation and sustainability.
   b. Enterprise Integrating: EA is the link between strategy and execution.
   c. Enterprise IT Architecture: EA is the glue between business and IT.
2. Objectives (desired changes) Cao et al. (2003), see Table 2 for more details:
   a. Cultural: Changes in organisational values.
   b. Political: Changes in power within the organization.
   c. Structural: Changes in functions (e.g., technological structure, infrastructure, etc.).
   d. Process: Changes in processes.
3. Resistance during planning Del Val and Fuentes (2003), see Table 3 for more details:
   a. Distorted Perception: Interpretation barriers and vague strategic priorities.
   b. Low Motivation.
   c. Lack of creative response.
4. Resistance during execution Del Val and Fuentes (2003), see Table 4 for more details:
   a. Political and Cultural Deadlocks.
   b. Other Reasons (unclassified).
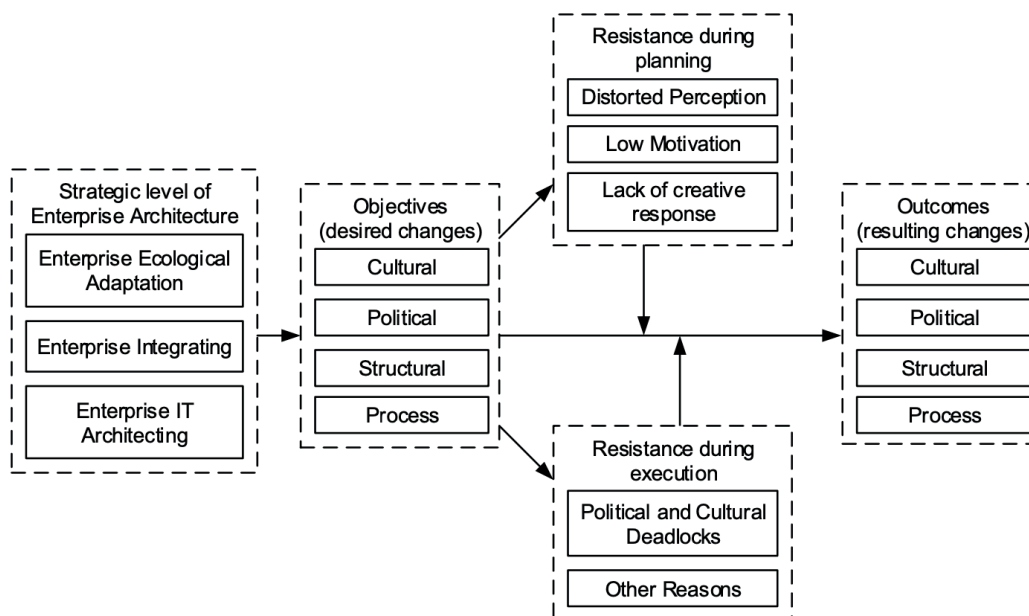
Figure 1: Conceptual Model of Resistance in EA Adoption Process (REAP)

Any change within an organisation, regardless of its size, will always provoke some form of resistance. Change resistance can be defined as "any phenomenon that hinders the process at its beginning or its development, aiming to keep the current situation" (Del Val & Fuentes, 2003). The REAP model reveals the resistance of EAA during the planning and execution phase. The selected strategic level thus sets limits to the goals one pursues and the type of organisational change that results. The logical reasoning of the model is as follows. Enterprise Architecture can be used on different strategic levels (Lapalme, 2012). The selected strategic level sets boundaries to EA adoption, e.g. what kind of objectives are set for the adoption and thus what kind of organisational change types may result (Cao et al., 2003).

Strategic level of Enterprise Architecture		
	Enterprise IT Architecting	**Enterprise Integrating**	**Enterprise Ecological Adaptation**
Motto	• Enterprise architecture is the glue between business and IT.	• Enterprise architecture is the link between strategy and execution.	• Enterprise architecture is the means for organizational innovation and sustainability.
Objectives and concerns	• Effectively enable the enterprise strategy. • Support IT planning and reduce costs. • Enable business.	• Effectively implement the enterprise strategy. • Support organizational coherence.	• Innovate and adapt. • Support organizational coherence. • Encourage system-inenvironment coevolution.
Skills	• Have technical competence and engineering knowledge.	• Facilitate smallgroup collaboration. • Apply systems thinking.	• Foster dialogue. • Apply systems and system-inenvironment thinking. • Facilitate largergroup collaboration.
Challenges	• Convince the organization to accept the designed plans.	• Understand organizational systemic dynamic. • Collaborate across the organization. • Encourage systems thinking and paradigm shift.	• Foster sense making. • Encourage systems thinking and system-inenvironment paradigm shift. • Collaborate across the organization.
Insights	• Permits the design of robust and complex technological solutions. • Foster the creation of high-quality models and planning scenarios.	• Permits the design of omprehensive solutions. • Enables significant organizational efficiency by eliminating unnecessary contradictions and paradoxes.	• Foster systems thinking and system-inenvironment paradigm shifts. • Fosters organizational innovation and sustainability.
Limitations	• Can produce inadequate or unfeasible solutions for the larger organizational context. • Struggles with solutions acceptance and implementation barriers. • Susceptible to "perfect" designs that support unsustainable strategies.	• Susceptible to "perfect" designs that support unsustainable strategies. • Requires a paradigm shift from reductionism to holism.	• Requires many organizational preconditions for management and strategy creation.

Table 1: Details of: Strategic level of Enterprise Architecture

Objectives (desired changes)	
#	**Explanation**
Process change	Change in flows and controls over flows.
Structural change	Change in functions, their organization, coordination and control.
Cultural change	Change in values, beliefs and human behaviour in terms of relationship to social rules and practices.
Political change	Change in power distribution and the way organizational issues are influenced.

Table 2: Details of: Objectives (desired changes)

#	Resistance during planning
#	**Resistance**
R1.1	**Distorted perception, interpretation barriers and vague strategic priorities**
R1.1.1	**Myopia**
	Myopia, or inability of the company to look into the future with clarity.
R1.1.2	**Denial**
	Denial or refusal to accept any information that is not expected or desired.
R1.1.3	**Perpetuation of ideas**
	Tendency to go on with the present thoughts although the situation has changed.
R1.1.4	**Implicit assumptions**
	Assumptions, which are not discussed due to its implicit character and therefore distort reality.
R1.1.5	**Communication barriers**
	Communication barriers, that lead to information distortion or misinterpretations.
R1.1.6	**Organisational silence**
	Organisational silence, which limits the information flow with individuals who do not express their thoughts, meaning that decisions are made without all the necessary information.
R1.2	**Low motivation**
R1.2.1	**Direct costs of change**
R1.2.2	**Cannibalisation costs**
	Change that brings success to a product but at the same time brings losses to others, so it requires some sort of sacrifice.
R1.2.3	**Cross subsidy comforts**
	Need for a change is compensated through the high rents obtained without change with another different fact, so that there is no real motivation for change.
R1.2.4	**Past failures**
	Past failures, which leave a pessimistic image for future changes.
R1.2.5	**Different interests among employees and management**
	Different interests among employees and management, or lack of motivation of employees who value change results less than managers value them.
R1.3	**Lack of creative response**
R1.3.1	**Fast and complex environmental changes**
	Fast and complex environmental changes, which do not allow a proper situation analysis.
R1.3.2	**Resignation**
	Reactive mind-set, resignation, or tendency to believe that obstacles are inevitable.
R1.3.3	**Inadequate strategic vision**
	Inadequate strategic vision or lack of clear commitment of top management to changes.

Table 3: Details of: Resistance during planning

#	Resistance during execution
#	**Resistance**
R2.1	**Political and cultural deadlocks**
R2.1.1	**Implementation climate and relation between change values and organisational values**
	Implementation climate and relation between change values and organisational values, considering that a strong implementation climate when the values' relation is negative will result in resistance and opposition to change.
R2.1.2	**Departmental politics**
	Departmental politics or resistance from those departments that will suffer with the change implementation.
R2.1.3	**Incommensurable beliefs**
	Incommensurable beliefs, or strong and definitive disagreement among groups about the nature of the problem and its consequent alternative solutions.
R2.1.4	**Deep rooted values**
	Deep rooted values and emotional loyalty.
R2.1.5	**Forgetfulness of the social dimension of changes**
R2.2	**Other sources**
R2.2.1	**Leadership inaction**
	Leadership inaction, sometimes because leaders are afraid of uncertainty, sometimes for fear of changing the status quo.
R2.2.2	**Embedded routines**
R2.2.3	**Collective action problems**
	Collective action problems, specially dealing with the difficulty to decide who is going to move first or how to deal with free-riders.
R2.2.4	**Capabilities gap**
	Lack of the necessary capabilities to implement change.
R2.2.5	**Cynicism**

Table 4: Details of: Resistance during execution

Appendix 6: EAAM of Syynimaa

Note: This appendix was created by Schreiber (2021) and derived from the Syynimaa (2015) research.

To overcome limitations of the traditional EA adoption method, Syynimaa (2015) has introduced an improved EA Adoption Method (EAAM). By following EAAM, organisations may increase the likelihood of successful EA adoption. EAAM helps in acquiring the mandate for EA adoption from top management, which is crucial to success. It also helps in supporting individual and organisational learning, which has also found to be essential in successful adoption. EAAM consists of six concepts (factors): EA Benefits, Performance Expectancy, Individual's learning stock, Organisation's learning stock, Managerial Intervention and EA Adoption. Figure 1 shows the conceptual model.
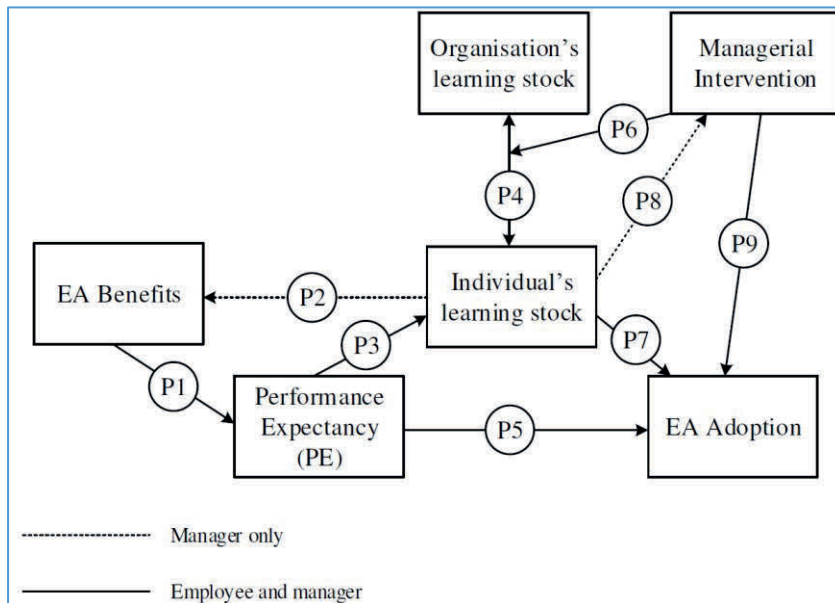
Figure 1: Conceptual model EAAM

Table 1 shows propositions of EAAM. The propositions show how the concepts of EAAM relate to each other, and how they influence EA Adoption.

# Proposition	Source
P1 Understanding EA Benefits influences Performance Expectancy	Nassiff (2012)
P2 Executive's understanding of EA meaning influences EA Benefits	Nassiff (2012)
P3 Performance Expectancy influences EA training	Hazen et al. (2014)
P4 Individual's and organisation's learning stocks influence each other	Crossan et al. (1999)
P5 Performance Expectancy influences EA Adoption	Hazen et al. (2014)
P6 Managerial Intervention influences feed-forward and feedback learning	Crossan et al. (1999)
P7 Individual's learning stock influences EA Adoption	Agarwal (2000)
	Elving (2005)
	Espinosa et al. (2011)
	Hazen et al. (2014)
	Holt et al. (2007)
P8 Executives Individual Attributes influences leadership style	Bass (1990)
	Crossan et al. (1999)
P9 Managerial Intervention influences EA Adoption	Agarwal (2000)
	Makiya (2012)

Table 1: Propositions of EAAM

Syynimaa (2015) offers GTRs (Grounded Technology rules) based on the conceptual model. The propositions are taken into account in the GTRs. Looking at propositions P1, P2, P3, P4, P5 and P7, understanding of EA Benefits indirectly influences the EA adoption through performance expectancy and individual's learning stock. To acquire the mandate for EA adoption from top-management, EAAM provided GTRs 1 to 4. Propositions 6 and 9 suggest managerial intervention influences EA adoption directly, but also indirectly by influencing organisational learning. GTRs for these propositions are provided in GTRs 5 and 6. The GTRs:

1. If you want to acquire a mandate for Enterprise Architecture adoption from top management, explain *Common EA Benefits* (P1, P3, P5, P7).
2. If you want to acquire a mandate for Enterprise Architecture adoption from top-management in a situation where manager's - view to EA is more business oriented; - rating of the organisation's EA maturity is low, or - EA experience is low, explain *Alignment Specific Benefits* (P1, P2, P3, P4, P5, P7).
3. If you want to acquire a mandate for Enterprise Architecture adoption from top-management in a situation where manager's - EA experience is high - perception of EA complexity is low, or - current EA authority is low, explain *Planned Vision Specific Benefits* (P1, P2, P3, P4, P5, P7).
4. If you want to acquire a mandate for Enterprise Architecture adoption from top-management in a situation where manager's - current EA authority is high, explain *Decision Making Specific Benefits* (P1, P2, P3, P4, P5, P7).
5. If you want to improve organisational learning during EA adoption in a situation where - EA challenges the current organisational learning, use *Transformational Leadership Style*. Otherwise use *Transactional Leadership Style* (P6).
6. If you want to improve EA adoption, use *Coercive Pressure* (P9).

The process of EA Adoption, according to Syynimaa, is shown in Figure 2.
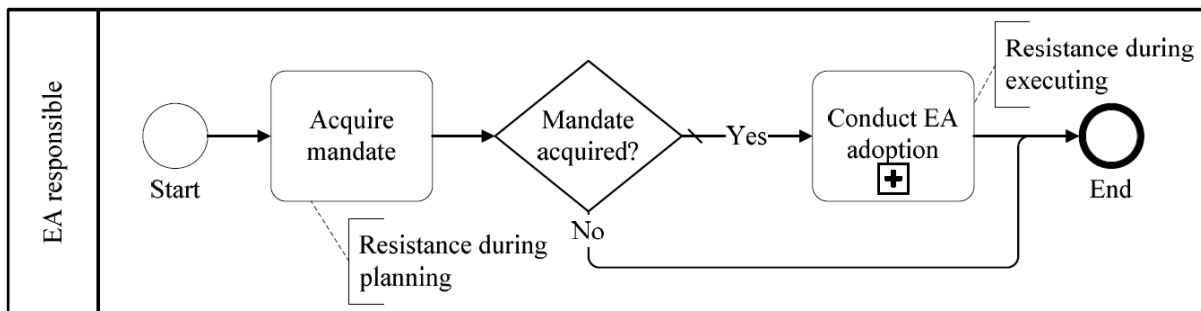
Figure 2: Process of EA Adoption according to Syynimaa (2015)

Appendix 7: The 6 Key Benefits of Enterprise Architecture for Your Organization

All modern businesses feature enterprise architecture (EA), whether they're aware of it or not. Of course, possessing awareness is much better than lacking it. A planned and organised approach allows you to assume full control of your assets and tackle escalating complexities in the business environment. EA is the art and science of designing, improving, and maintaining IT infrastructure. It usually takes the form of a compound of multiple frameworks. And it's no longer limited to "keeping the lights on". It represents a total methodology, one that can be visualised, described, and adopted. You can equip your organisation with a coherent set of concepts and practices for success. And this is associated with a slew of proven benefits you can't afford to miss out on. Here is how and why to let EA govern your information systems.

1. A Strategic Overview

EA is no longer the sole function of IT, isolated from the rest of the organisation. Nowadays, it has become much more of a bridge between business and IT. First off, it provides you with a holistic overview of your IT parameter and a technological roadmap. It's a strategic lens for observing the entirety of your infrastructure. You gain crucial insights and a comprehensive picture, one that minimises miscommunication. Think of it as a conceptual blueprint, an integrated treasury of information. One employs it to set the stage for the delivery of concrete products, documents, and other structural elements. Moreover, it can help you discover all the dependencies and points of synergy between them.

2. Reducing Complexity

EA is a tried and tested way of streamlining the core working of an organisation. This is a real game-changer, considering most businesses operate as a mesh of systems and components. Shying away from facing this complexity isn't an option. EA encourages you to adopt a proactive, outcome-focused approach. Through a selection of the right principles, tools, and standards facilitates the calibration and automation of processes. The result should be nothing short of an enterprise-wide transformation endeavour. You align tech needs with business wants, enabling strategic changes and pivots (such as acquisitions and mergers). Data-driven businesses that heavily rely on technology stand to benefit the most here.

3. Trimming Costs

This kind of organisational overhaul has further positive implications. It leads to more efficient resource allocation and lets you score significant savings. This is due to EA decreasing and consolidating management, maintenance, and operational costs. At the same time, impact analysis eliminates redundancies and duplication (unnecessary rework). You're able to boost stability and overall product quality while leveraging shared capabilities. Along similar lines, many organisations have achieved faster time to market with EA. All of this amounts to elevated ROI and overall profitability. You can maintain a sustainable pace of growth and manage integration projects fuss-free. So do yourself a favour and embrace the concept sooner rather than later.

4. Standardisation and Flexibility

EA fosters a higher level of IT standardisation. It empowers decision-makers to flesh out sound business and operational models. Most of them mark the transition away from silo-based systems. Furthermore, when done right, EA makes sure all employees are on the same page. It's easier to manage multiple business units, as well as networks. You can, amongst other things, offer better software support and guidance than ever before. Finally, EA is also an opportunity to maintain optimal productivity and operability. It integrates services and applications without friction and

increases their portability. So, harness the power of EA to strengthen the organisation from within. Capitalise on newfound opportunities to create, buy, or outsource your IT solutions.

5. Security Gains

EA is the blueprint for addressing the grave cybersecurity concerns of today. As a key tool in the arsenal, it works wonders for data protection and security processes in general. Updates and patches are the most common tools used across industry sectors. All in all, you gain a real fighting chance against the plight of threats that lurk all around. Data breaches and thefts are just the tips of the iceberg. There's no shortage of other ever-more-sophisticated dangers. We should also mention risks that stem from internal IT missteps. We're talking about things such as shadow IT and redundant applications. EA adds value in this area as well. It holds the key to protecting, grouping, and making better use of your assets. As an added bonus, you maintain consumer trust by taking good care of their data.

6. Change Analysis and Adaptability

EA is conducive to tech innovation, transformation, and smooth stack implementation.
Higher agility means you respond to sudden shifts in the industry and the market. You bolster your ability to properly assess the impact of change and make educated adjustments. It might also make sense to go the extra mile and revamp your business model and strategies. At the very least, do away with outdated practices that cause more harm than good. You're likely to decrease project, investment, and business risks that way. The list of benefits goes on and includes regulatory and legal changes that disrupt the status quo. GDPR is a prime example of how compliance affects financial performance and brand perception. So, stay abreast of the latest developments and be ahead of the curve.

Source: Architecture Center (2020)

Appendix 8: Closed questionary invitation letter

Beste collega,

Kan je mij alsjeblieft helpen?

Ter afronding van mijn masteropleiding 'Business Process Management and IT' aan de Open Universiteit van Nederland, doe ik momenteel onderzoek naar de adoptie van Enterprise Architectuur (EA) binnen een manufacturing environment met als doel de factoren die invloed hebben op de adoptie van Enterprise Architectuur te identificeren en hoe we deze factoren zo kunnen beïnvloeden om het succes van EA adoptie te vergroten.

Met behulp van een vragenlijst wil ik onderzoeken welke factoren en in welke mate invloed hebben op de adoptie van EA binnen onze organisatie. Het beantwoorden van de vragen zal minder dan 10 minuten in beslag nemen. Je medewerking aan het onderzoek wordt door mij erg gewaardeerd.

De link naar de vragenlijst is: EA adoption binnen een manufacturing environment.

Opmerking: Bij het onderzoek worden de AVG-regels nageleefd en de ingevulde vragenlijst zullen anoniem worden verwerkt!

Ik dank je bij voorbaat en met vriendelijke groet,

Casper Theunissen
Afdeling: SPME I&S ENB IPB
Gebouw: 3D-10 - Room 0-009
Telefoon: +31 (0)251 499681

Enterprise Architectuur adoptie binnen een manufacturing environment

Dankjewel voor je deelname!

Enterprise Architectuur (EA) is de organisatielogica van bedrijfsprocessen die de integratie en standaardisatie van het bedrijfsmodel weerspiegelt. Daarmee biedt EA een langetermijnvisie op de processen, systemen en technologie van een bedrijf. Om tot een langetermijnvisie te komen is de adoptie van EA belangrijk.

De vragenlijst is opgebouwd op basis van resultaten van eerdere studies waarbij 25 adoptiefactoren zijn geïdentificeerd. Deze factoren zijn gebaseerd op drie categorieën: organisatorische factoren, EA-gerelateerde factoren en omgevingsfactoren.

Met de vragenlijst wil ik onderzoeken welke factoren een rol spelen binnen onze organisatie. Bij het invullen is het van belang dat je bij elke factor aangeeft wat jij denkt en in welke mate ("Erg negatief" tot "Erg positief") de factor een rol speelt bij EA-adoptie. De factoren zijn onderverdeeld in drie categorieën: organisatorische factoren, EA-gerelateerde factoren en omgevingsfactoren.

De enquête duurt ongeveer 12 minuten om te voltooien.
Uw naam en het emailadres waarmee u het resultaat van de enquête opstuurt zullen niet worden opgeslagen, alleen de resultaten van de enquête worden anoniem verwerkt.

Geef per factor (1 t/m 25) aan of deze volgens u een rol speelt bij de adoptie van Enterprise Architectuur binnen onze organisatie:

* Vereist

* Dit formulier registreert uw naam, vul uw naam in.

Organisatorische factoren

Organisatorische factoren zijn factoren die verband houden met de capaciteiten, de bedrijfscultuur of de organisatiestructuur. Welke van deze factoren heeft volgens jou invloed op de adoptie van EA binnen de organisatie en in welke mate?

1.Is de definitie van EA duidelijk? *

○ Ja - ga naar 3

○ Nee

2.Kun je omschrijven waarom de definitie van EA niet duidelijk is: *

3.In welke mate heeft de factor 'Organisatiestructuur' invloed op de adoptie van EA?
Toelichting: een organisatiestructuur is de manier waarop alle taken/processen en afdelingen binnen een organisatie zijn verdeeld en samenhangen. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

4.In welke mate heeft de factor 'Vermogen tot veranderingsmanagement' invloed op de adoptie van EA?
Toelichting: veranderingsmanagement zijn de voortdurende aanpassing van de ondernemingsstrategieën en -structuren aan de randvoorwaarden die invloed op de onderneming hebben. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

5.In welke mate heeft de factor 'Verandering in organisatiecultuur' invloed op de adoptie van EA?
Toelichting: dit betreft verandering van gedrag van mensen ten aanzien van EA. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

6.In welke mate heeft de factor 'Het doorvoeren van veranderingen binnen de organisatiestructuur' invloed op de adoptie van EA?
Toelichting: let op, het betreft hier de organisatie die veranderingen door gaat. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

7. In welke mate heeft de factor 'IT-portfoliomanagement' invloed op de adoptie van EA?
Toelichting: IT-portfoliomanagement is de toepassing van systematisch beheer op de investeringen, projecten en activiteiten van IT-afdelingen van ondernemingen. Voorbeelden van IT-portfolio's zijn geplande initiatieven, projecten en doorlopende IT-services. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

8. In welke mate heeft de factor 'Strategiegedreven verandering' invloed op de adoptie van EA?
Toelichting: de bedrijfsstrategie is bijvoorbeeld veranderingen doorvoeren op basis van de visie om bijvoorbeeld winst te behalen, structuur te creëren of groei te realiseren. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

9. In welke mate heeft de factor 'Gestructureerd besluitvormingsproces' invloed op de adoptie van EA?
Toelichting: een belangrijk kenmerk van besluitvorming is dat alternatieven tegen elkaar afgewogen moeten worden. In veel gevallen hebben deze alternatieven betrekking op toekomstige gebeurtenissen die moeilijk te voorspellen zijn. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

10. In welke mate heeft de factor 'Conformatie aan organisatorische veranderingen' invloed op de adoptie van EA?
Toelichting: draagvlak bij de werknemers voor organisatorische veranderingen. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

11. In welke mate heeft de factor 'Verschil van inzicht betreffende EA' invloed op de adoptie van EA?
    Toelichting: verschil van inzicht kan ontstaan door verschillenden belangen. * Erg negatief

Negatief	Geen	Positief	Erg positief	Weet ik niet
○	○	○	○	○	○

12. In welke mate heeft de factor 'Sociaal perspectief' invloed op de adoptie van EA?
    Toelichting: het sociale perspectief is het effect op/van individuen. *

Zeer mee Geen oneens	Oneens	Neutraal	Mee eens	Geheel mee eensmening	
○	○	○	○	○	○

13. In welke mate heeft de opvatting 'EA gaat meer over processen dan over technologie' invloed op de adoptie van EA?
    Toelichting: EA draait meer om mensen dan om technologie. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

14. In welke mate heeft de factor 'Weerstand tegen verandering' invloed op de adoptie van EA?
    Toelichting: denk hierbij aan: verschillende motieven, capaciteiten en situationele factoren. *

ik niet | Erg negatief | Negatief | Geen | Positief | Erg positief Weet

○ ○ ○ ○ ○ ○

15. In welke mate heeft de factor 'Belang van leiderschap' invloed op de adoptie van EA?
    Toelichting: leiderschap is het gedrag waarmee je anderen beïnvloedt. Een leider is
    degene die een groep mensen weet te motiveren en te activeren tot het bereiken van een
    gemeenschappelijk doel. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

16. In welke mate heeft de factor 'EA-mandaat (of het gebrek aan mandaat)' invloed op de
    adoptie van EA?
    Toelichting: de bevoegdheid om in naam van een ander te handelen. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

17. In welke mate heeft de factor 'Organisatorische positie van de EA' invloed op de adoptie
    van EA?
    Toelichting: heeft de EA-functie de juiste positie binnen de organisatie? *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

18. In welke mate heeft de factor 'Communicatie' invloed op de adoptie van EA?
    Toelichting: is er organisatiebrede communicatie ten aanzien van EA? *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

19. In welke mate heeft de factor 'Door de organisatie opgestelde doelen ten aanzien van de
    EA' invloed op de adoptie van EA?

Toelichting: organisatie is de hele Enterprise. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

20.Heb je nog opmerkingen en/of vragen ten aanzien van de 'organisatorische factor' vragen? *

EA-gerelateerde factoren

EA-gerelateerde factoren zijn factoren die verband houden met de EA-discipline of de EA-rol, zoals EAvaardigheden. Welke van deze factoren heeft volgens jou invloed op de adoptie van EA binnen onze organisatie en in welke mate?

21.In welke mate heeft de factor 'Gebrek aan kennis over de definitie van EA' invloed op de adoptie van EA?
Toelichting: dit zijn de begrippen/definities die binnen het EA-domein worden gebruikt. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

22.In welke mate heeft de factor 'Selectie van het EA-framework' invloed op de adoptie van EA?
Toelichting: een EA-framework definieert hoe een bedrijfsarchitectuur tot stand moet worden gebracht, gedocumenteerd en gebruikt. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

23.In welke mate heeft de factor 'Het gebruik van principes' invloed op de adoptie van EA?

Toelichting: de principes die worden gebruikt als leidraad voor EA. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	◯	◯	◯	◯	◯	◯

24.In welke mate heeft de factor 'Ervaring en vaardigheden van EA-personeel' invloed op de adoptie van EA?
Toelichting: hoe competent zijn de architecten? *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	◯	◯	◯	◯	◯	◯

25.Heb je nog opmerkingen en/of vragen ten aanzien van de 'EA-gerelateerde factor' vragen? *

Environment gerelateerde factoren

Omgevingsfactoren houden verband met de context waarin de organisatie opereert, zoals wet- en regelgeving. Welke van deze factoren heeft volgens jou invloed op de adoptie van EA binnen onze organisatie en in welke mate?

26. In welke mate heeft de factor 'De champion van EA' invloed op de adoptie van EA?
    Toelichting: initiatiefnemer van de EA functie zoals eigen organisatie, politiek (wet en regelgeving) of externe stakeholders die (bewust/onbewust) eisen opleggen. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

27. In welke mate heeft de factor 'Problemen met de interoperabiliteit van (verwante) EA's' invloed op de adoptie van EA?
    Toelichting: tussen architecten onderling kunnen interoperabiliteitsissues zijn voor verschillende domeinen die met elkaar moeten samenwerken. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

28. In welke mate heeft de factor 'Sturende kracht van externe partijen' invloed op de adoptie van EA?
    Toelichting: EA moet worden ingericht met oog voor andere EA-initiatieven: interoperabiliteit en gebruik van standaarden. *

	Erg negatief	Negatief	Geen	Positief	Erg positief	Weet ik niet
	○	○	○	○	○	○

29. Heb je nog opmerkingen en/of vragen ten aanzien van de 'Environmentgerelateerde factor' vragen? *

Algemeen

30. Welke van de volgende rollen omschrijft uw functie het best? *

○ Business Domain Architect

○ Business Analyst

○ Domain Architect

○ IT/System Analyst

○ Enterprise Architect

○ Information (Data) Architect

○ Technical (ICT) Architect

○ [   ]

Andere

31. Uitnodiging deelname interview.
Ik zou het zeer waarderen als ik jou vanuit jouw rol zou mogen interviewen. Bij het interview draait het allemaal om jouw inzicht, ervaring en mogelijke ideeën betreffende EA-adoptie binnen de organisatie. De deelname aan een interview is vrijwillig. Er zullen maximaal 6 interviews worden afgenomen, dit i.v.m. de doorlooptijd van de studie.
Kan je hieronder aangeven of je bereid bent om deel te nemen aan een interview: *

○ Ja - Dan zal ik een Teams-afspraak inplannen.

○ Ja - Maar eerst graag even overleg.

○ Nee

Microsoft Forms

Appendix 10: Results of closed questionary

Enterprise Architectuur adoptie binnen een manufacturing environment

7	17:45	Actief
Antwoorden	Gemiddelde tijd om te voltooien	Status

1. Is de definitie van EA duidelijk?

● Ja - ga naar 3	7	
● Nee	0	
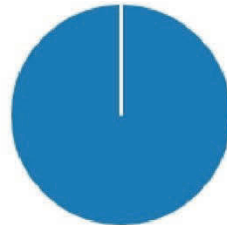
2. Kun je omschrijven waarom de definitie van EA niet duidelijk is:

Meest recente antwoorden

"overgeslagen conform instructie "

7
Antwoorden

3. In welke mate heeft de factor 'Organisatiestructuur' invloed op de adoptie van EA?

Toelichting: een organisatiestructuur is de manier waarop alle taken/processen en afdelingen binnen een organisatie zijn verdeeld en samenhangen.

■ Erg negatief ■ Negatief ■ Geen ■ Positief ■ Erg positief ■ Weet ik niet

100%   0%   100%
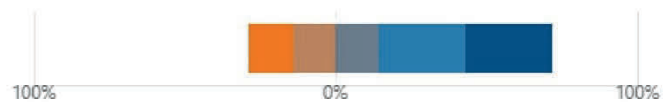
4. In welke mate heeft de factor 'Vermogen tot veranderingsmanagement' invloed op de adoptie van EA?

Toelichting: veranderingsmanagement zijn de voortdurende aanpassing van de ondernemingsstrategieën en -structuren aan de randvoorwaarden die invloed op de onderneming hebben.

5. In welke mate heeft de factor 'Verandering in organisatiecultuur' invloed op de adoptie van EA?

Toelichting: dit betreft verandering van gedrag van mensen ten aanzien van EA.

6. In welke mate heeft de factor 'Het doorvoeren van veranderingen binnen de organisatiestructuur' invloed op de adoptie van EA?

Toelichting: let op, het betreft hier de organisatie die veranderingen door gaat.

7. In welke mate heeft de factor 'IT-portfoliomanagement' invloed op de adoptie van EA?

   Toelichting: IT-portfoliomanagement is de toepassing van systematisch beheer op de investeringen, projecten en activiteiten van IT-afdelingen van ondernemingen. Voorbeelden van IT-portfolio's zijn geplande initiatieven, projecten en doorlopende IT-services.

   Erg negatief   Negatief   Geen   Positief   Erg positief   Weet ik niet

   100%   0%   100%

8. In welke mate heeft de factor 'Strategiegedreven verandering' invloed op de adoptie van EA?

   Toelichting: de bedrijfsstrategie is bijvoorbeeld veranderingen doorvoeren op basis van de visie om bijvoorbeeld winst te behalen, structuur te creëren of groei te realiseren.

   Erg negatief   Negatief   Geen   Positief   Erg positief   Weet ik niet

   100%   0%   100%

9. In welke mate heeft de factor 'Gestructureerd besluitvormingsproces' invloed op de adoptie van EA?

   Toelichting: een belangrijk kenmerk van besluitvorming is dat alternatieven tegen elkaar afgewogen moeten worden. In veel gevallen hebben deze alternatieven betrekking op toekomstige gebeurtenissen die moeilijk te voorspellen zijn.

   Erg negatief   Negatief   Geen   Positief   Erg positief   Weet ik niet

   100%   0%   100%

10. In welke mate heeft de factor 'Conformatie aan organisatorische veranderingen' invloed op de adoptie van EA?

Toelichting: draagvlak bij de werknemers voor organisatorische veranderingen.

■ Erg negatief ■ Negatief ■ Geen ■ Positief ■ Erg positief ■ Weet ik niet

11. In welke mate heeft de factor 'Verschil van inzicht betreffende EA' invloed op de adoptie van EA?

Toelichting: verschil van inzicht kan ontstaan door verschillenden belangen.

■ Erg negatief ■ Negatief ■ Geen ■ Positief ■ Erg positief ■ Weet ik niet

12. In welke mate heeft de factor 'Sociaal perspectief' invloed op de adoptie van EA?

Toelichting: het sociale perspectief is het effect op/van individuen.

■ Zeer mee oneens ■ Oneens ■ Neutraal ■ Mee eens ■ Geheel mee eens ■ Geen mening

13. In welke mate heeft de opvatting 'EA gaat meer over processen dan over technologie' invloed op de adoptie van EA?

Toelichting: EA draait meer om mensen dan om technologie.

■ Erg negatief ■ Negatief ■ Geen ■ Positief ■ Erg positief ■ Weet ik niet

14. In welke mate heeft de factor 'Weerstand tegen verandering' invloed op de adoptie van EA?

Toelichting: denk hierbij aan: verschillende motieven, capaciteiten en situationele factoren.

15. In welke mate heeft de factor 'Belang van leiderschap' invloed op de adoptie van EA?

Toelichting: leiderschap is het gedrag waarmee je anderen beïnvloedt. Een leider is degene die een groep mensen weet te motiveren en te activeren tot het bereiken van een gemeenschappelijk doel.
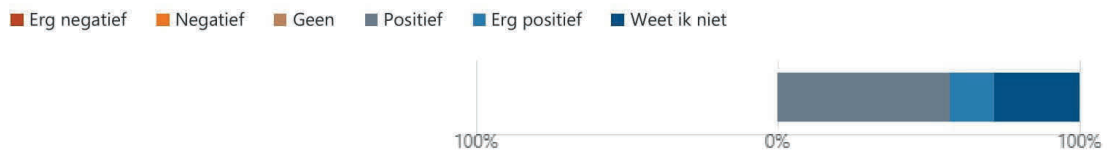
16. In welke mate heeft de factor 'EA-mandaat (of het gebrek aan mandaat)' invloed op de adoptie van EA?

Toelichting: de bevoegdheid om in naam van een ander te handelen.

17. In welke mate heeft de factor 'Organisatorische positie van de EA' invloed op de adoptie van EA?

Toelichting: heeft de EA-functie de juiste positie binnen de organisatie?

■ Erg negatief ■ Negatief ■ Geen ■ Positief ■ Erg positief ■ Weet ik niet

100%   0%   100%

18. In welke mate heeft de factor 'Communicatie' invloed op de adoptie van EA?

Toelichting: is er organisatiebrede communicatie ten aanzien van EA?

■ Erg negatief ■ Negatief ■ Geen ■ Positief ■ Erg positief ■ Weet ik niet

100%   0%   100%

19. In welke mate heeft de factor 'Door de organisatie opgestelde doelen ten aanzien van de EA' invloed op de adoptie van EA?

Toelichting: organisatie is de hele Enterprise.

■ Erg negatief ■ Negatief ■ Geen ■ Positief ■ Erg positief ■ Weet ik niet

100%   0%   100%
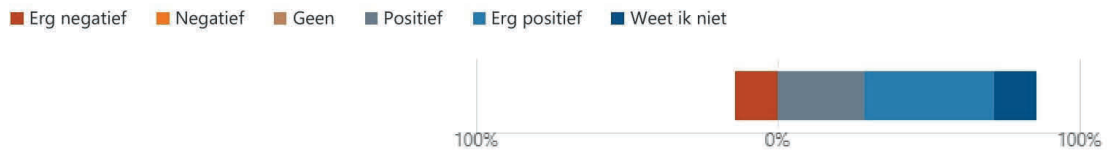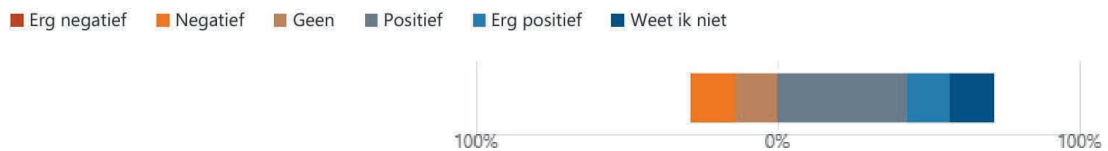
20. Heb je nog opmerkingen en/of vragen ten aanzien van de 'organisatorische factor' vragen?

Meest recente antwoorden

7

Antwoorden

"*Lastig wijze van vraagstelling, waar kan EA aan bijdragen loopt lekke...*

"*nee*"

"*-*"

21. In welke mate heeft de factor 'Gebrek aan kennis over de definitie van EA' invloed op de adoptie van EA?

Toelichting: dit zijn de begrippen/definities die binnen het EA-domein worden gebruikt.

■ Erg negatief　■ Negatief　■ Geen　■ Positief　■ Erg positief　■ Weet ik niet

22. In welke mate heeft de factor 'Selectie van het EA-framework' invloed op de adoptie van EA?

Toelichting: een EA-framework definieert hoe een bedrijfsarchitectuur tot stand moet worden gebracht, gedocumenteerd en gebruikt.

■ Erg negatief　■ Negatief　■ Geen　■ Positief　■ Erg positief　■ Weet ik niet

23. In welke mate heeft de factor 'Het gebruik van principes' invloed op de adoptie van EA?

Toelichting: de principes die worden gebruikt als leidraad voor EA.

■ Erg negatief　■ Negatief　■ Geen　■ Positief　■ Erg positief　■ Weet ik niet

24. In welke mate heeft de factor 'Ervaring en vaardigheden van EA-personeel' invloed op de adoptie van EA?

Toelichting: hoe competent zijn de architecten?

■ Erg negatief　■ Negatief　■ Geen　■ Positief　■ Erg positief　■ Weet ik niet

25. Heb je nog opmerkingen en/of vragen ten aanzien van de 'EA-gerelateerde factor' vragen?

6

Antwoorden

"Bij vraag 21 is bedoeld dat het ontbreken van begrippen etc. niet bev…

"Als we een EA afdeling zouden hebben zou ik niet weten wie daarin w…

"-"

26. In welke mate heeft de factor 'De champion van EA' invloed op de adoptie van EA?

Toelichting: initiatiefnemer van de EA functie zoals eigen organisatie, politiek (wet en regelgeving) of externe stakeholders die (bewust/onbewust) eisen opleggen.

■ Erg negatief   ■ Negatief   ■ Geen   ■ Positief   ■ Erg positief   ■ Weet ik niet

27. In welke mate heeft de factor 'Problemen met de interoperabiliteit van (verwante) EA's' invloed op de adoptie van EA?

Toelichting: tussen architecten onderling kunnen interoperabiliteitsissues zijn voor verschillende domeinen die met elkaar moeten samenwerken.

■ Erg negatief   ■ Negatief   ■ Geen   ■ Positief   ■ Erg positief   ■ Weet ik niet

28. In welke mate heeft de factor 'Sturende kracht van externe partijen' invloed op de adoptie van EA?

Toelichting: EA moet worden ingericht met oog voor andere EA-initiatieven: interoperabiliteit en gebruik van standaarden.

■ Erg negatief   ■ Negatief   ■ Geen   ■ Positief   ■ Erg positief   ■ Weet ik niet

29. Heb je nog opmerkingen en/of vragen ten aanzien van de 'Environmentgerelateerde factor' vragen?

Meest recente antwoorden

7

Antwoorden

"Er zijn altijd sturende krachten, hangt dus al van welke je meeneemt "

"nee"

"-"

30. Welke van de volgende rollen omschrijft uw functie het best?

🔵 Business Domain Architect	2	
🟠 Business Analyst	0	
🟢 Domain Architect	1	
🔴 IT/System Analyst	0	
🟣 Enterprise Architect	0	
🟤 Information (Data) Architect	1	
🟣 Technical (ICT) Architect	0	
⚪ Andere	3	

31. Uitnodiging deelname interview.

Ik zou het zeer waarderen als ik jou vanuit jouw rol zou mogen interviewen. Bij het interview draait het allemaal om jouw inzicht, ervaring en mogelijke ideeën betreffende EA-adoptie binnen de organisatie. De deelname aan een interview is vrijwillig. Er zullen maximaal 6 interviews worden afgenomen, dit i.v.m. de doorlooptijd van de studie.

Kan je hieronder aangeven of je bereid bent om deel te nemen aan een interview:

🔵 Ja - Dan zal ik een Teams-afsp...	2
🟠 Ja - Maar eerst graag even ov...	1
🟢 Nee	3
🔴 Andere	1
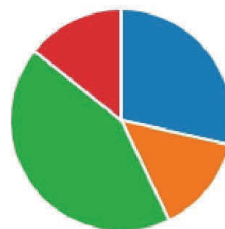
Appendix 11: Interview questions and topic list

Interview questions:

#	*Organisatiegerelateerde vragen*
IQ12	a. Kunt u toelichten welke ervaring u en uw organisatie heeft op het gebied van EA? b. Bent u opgeleid of getraind op het gebied van EA?
IQ0	a. Zijn er belangrijke veranderingen waarmee uw organisatie in de afgelopen jaren te maken heeft gehad?
	TQ-1 Wat is het vermogen van de organisatie om veranderingen door te voeren?
IQ1	a. Beschrijf dergelijke verandering en hoe deze zijn uitgevoerd. Welke uitdagingen, indien van toepassing, brachten deze verandering met zich mee.
	TQ-2 Wat is het niveau van het verandermanagement capaciteit van de organisatie? *TQ-3 Wat is het niveau van weerstand tegen verandering binnen de organisatie?*
IQ2	a. Beschrijf het proces hoe nieuwe informatiesystemen worden gedefinieerd, verworven of geïmplementeerd en binnen uw organisatie worden geïntroduceerd.
	TQ-4 Wat is het niveau van het IT-portfoliomanagement binnen de organisatie?
IQ3	a. Beschrijf hoe nieuwe EA ontwikkelingsinitiatieven binnen uw organisatie worden geïntroduceerd. b. Wie of welke partij stuurt dergelijke initiatieven aan? c. Hoe belangrijk is dit voor het succes van het initiatief?
	TQ-5 Is er een sponsor/champion binnen de organisatie die EA of vergelijkbare initiatieven stimuleert?
IQ4	a. Beschrijf op welke basis ontwikkelingsinitiatieven binnen uw organisatie worden genomen.
	TQ-6 Biedt het topmanagement voldoende ondersteuning voor EA of soortgelijke initiatieven?
IQ5	a. Beschrijf hoe EA in uw organisatie is georganiseerd.
	TQ-7 Waar bevindt de EA-functie zich binnen de organisatie? *TQ-8 Wie is verantwoordelijk voor EA binnen de organisatie?*
IQ6	a. Beschrijf hoe de communicatie binnen uw organisatie is georganiseerd. b. Hoe zit het met de communicatie tussen business units stakeholders en externe stakeholders?
	TQ-9 Is er communicatie ten aanzien van EA ingericht binnen de organisatie? *TQ-10 Wat is het niveau van communicatie tussen belanghebbenden?* *TQ-11 Hoe worden nieuwe initiatieven in de organisatie gecommuniceerd?*
IQ7	a. Leg uit wat uw verwachtingen zijn bij het gebruik van EA voor uzelf en de organisatie. b. Hoe verhouden deze zich tot de strategie van uw organisatie?

		TQ-12 Is er een duidelijk doel gesteld voor EA?
		TQ-13 Moet er een business case worden opgelost door middel van EA?
		TQ-14 Is EA gerelateerd aan de strategie van organisaties?
	IQ8	a. Welk soort verwachtingen van andere stakeholders heeft u onder ogen gezien/gekregen?
		TQ-15 Wat zijn de verwachtingen van stakeholders en zijn deze wellicht tegenstrijdig?
		TQ-16 Zijn de verwachtingen in overeenstemming met de formele rol van de belanghebbenden?
	IQ9	a. Op welke manieren worden veranderingen in EA geaccepteerd en ondersteund door de verschillende stakeholders in de organisatie?
		TQ-12 Is er een duidelijk doel gesteld voor EA?
		TQ-14 Is EA gerelateerd aan de strategie van organisaties?
#		**Omgevingsfactoren gerelateerde vragen**
	IQ10	a. Leg uit hoe de EA-projecten zich verhouden tot de verschillende programma's binnen de organisaties.
		b. Hoe worden dergelijke programma's gecoördineerd?
		c. Wat is de machtsverhoudingen in zo'n coördinatie?
		TQ-17 Wordt EA adoptie gestart om te voldoen aan een externe druk?
		TQ-18 Hoe verhoudt de eigen EA zich tot soortgelijke EA's (bijvoorbeeld andere landenorganisaties)?
		TQ-19 Vind er coördinatie plaats ten aanzien van EA vanuit de moederorganisaties?
		TQ-20 Kan het gebruik van EA worden afgedwongen door derden?
#		**Enterprise Architecture gerelateerde vragen**
	IQ11	a. Beschrijf hoe het voor de EA-implementatie gebruikte framework is gekozen?
		b. Vereiste dit framework enige aanpassing om aan uw doelstellingen te voldoen?
		c. Leg uit: Wat zijn de principes waarop de EA-implementatie is gebaseerd?
		d. Leg uit in uw eigen woorden EA en gerelateerde termen.
		TQ-21 Hoe is/wordt het EA-framework geselecteerd?
		TQ-22 Kan het geselecteerde EA-framework worden gebruikt zoals het standaard is?
		TQ-23 Is de definitie van EA te vaag?
		TQ-24 Worden principes gebruikt om EA richting te geven?
	IQ12	a. Welke onderdelen van EA, indien aanwezig, zijn binnen de organisatie zijn het meest uitdagend of problematisch?
		b. Zijn er externe specialisten/consultants betrokken geweest bij de implementatie van EA?
		TQ-25 Zijn er voldoende EA-vaardigheden aanwezig binnen de organisatie?

Topic list:

Topics	Omschrijving	Opmerking
Introductie over mijzelf	• Ik beschrijf kort het doel van het onderzoek.	
Introductie respondent	• Toestemming (AVG, Geluidsopnamen) • Kan je beschrijven welke functie je bekleedt binnen de organisatie? • Ken je de EA-afdeling en wat hun taak is? • Ken je de business domain architect die verantwoordelijk is voor jouw gebied? • Zou je kunnen omschrijven wat EA voor jou betekent?	Wanneer de kennis voor dit onderzoek onvoldoende is korte introductie houden doormiddel van filmpje 'Why Enterprise Architecture'.
Veranderingen	• Zijn er grote veranderingen binnen die organisatie gerealiseerd? • Welke/Wat voor veranderingen? • Indien ja, wat was het aandeel IT binnen die verandering? • Kan je omschrijven hoe deze veranderingen zijn doorgevoerd? • Welke uitdagingen bracht dit met zich mee? • Kan je beschrijven welke methodes hierbij zijn gebruikt?	Afgelopen jaren Indien van toepassing

	• Werd de IT-verandering als een Waterfall of Agile uitgevoerd? • Was er een architect betrokken bij de IT-verandering? • Was deze zichtbaar?	
Opleiding	• Bent je opgeleid of getraind op het gebied van EA? o Betrof dit een interne of externe opleiding/ training? • Op welk initiatief bent je de opleiding/ training gestart?	Indien van toepassing Indien van toepassing

De rest van de vragen zijn alleen relevant als er een IT-component in de verandering zit. Dus aansturen op die veranderingen met een IT-component. Alle vragen hieronder gaan ook alleen over die IT-component al dan niet in combinatie met de rest van het project!!!

Organisatie	• Hoe wordt een verandering georganiseerd? • Hoe ziet zo'n team samenstelling eruit? • Was er een (Business Domain) Architect betrokken of zat deze in het team?	Team setup Projectmatig Agile bv Rollen
Communicatie	Hoe communiceerde de Architect: • Middels EA-modellen? • Documenten (start en/of) solution architectuur? • Was de architect aanwezig in opstart en ontwerp vergaderingen? • Heeft de architect de resultaten gecontroleerd op navolgen van de solution architectuur of heeft deze de architectuur aangepast aan het resultaat?	Product en architectuur moeten aan het eind van het project altijd overeenkomen. Een ontwikkeling kan afwijken van een architectuur als daar een goede reden voor is, maar alleen in consultatie met de architect. De laatste past de solution architectuur

		dan aan.
Belang EA	• Is de inbreng van de architect (voor het gevoel) nuttig geweest voor het project?	*Wat waren de ervaringen?* *Met name voor het gevoel, want als men vindt dat de inbreng niet nuttig is geweest heeft de architect zijn communicatie niet voldoende gedaan.*
Uitdagingen	• Wat waren de grootste uitdagingen voor de verandering? • Heeft de architect daarbij geholpen om tot een betere en/of snellere oplossing te komen?	

Weerstand	• Riep de verandering weerstand op in:
	   o Binnen de organisatie?
	   o Binnen het veranderteam?
	   o Bij de Architect?
	 • Riep de input/bijdrage van de architect weerstand op?
	   o Zo ja, in wat voor opzicht?	

Framework	• Werd er voor de verandering één bepaald of meerdere frameworks gebruikt?
	   o Zo ja welke?
	   o Zo ja waarom?
	   o In hoeverre heeft het gebruik van deze frameworks bijgedragen aan het doorvoeren van de verandering?
		Voor de IT b.v. Prince2, Scaled Agile Framework (SAFe), SCRUM, Architecture framework 'Togaf'

Vaardigheden	• Welke vaardigheden waren er nodig voor de verandering? • Konden deze vaardigheden allemaal worden ingevuld door mensen uit de organisatie of moesten daar ook externe	

	partijen voor worden uitgenodigd? • Waren er meerdere architecten rollen betrokken?	Architecten komen in 3 smaken: 1. Business Domain Architect (supervisie), 2. Solution Architect, 3. Technical Architect (als nodig).
Externe Partijen	• Welke externe partijen zijn er bij de verandering betrokken geweest? o Zo ja waarom? • Welke skills werden er ingehuurd? • Werd er ook een architect ingehuurd?	