Enterprise Integration:

An analysis of complaint data

Kim Wahlstedt

Master's Thesis

International Business Management

2020

MASTER'S THESIS	
Arcada	
Degree Programme:	International Business Management
Identification number:	7264
Author:	Kim Wahlstedt
Title:	Enterprise Integration: An analysis of complaint data
Supervisor (Arcada):	Kaj-Mikael Björk
Commissioned by:	N/A

Abstract:
Enterprise Architecture (EA) is a strategic instrument used to control and manage the structure and description of an enterprise and its relationships. Facilitating transactions is a key aspect of enterprise architecture. Enterprise Integration (EI) is managing interactions with other enterprises using EA tools and concepts. This thesis is an interpretative case study with aspects of positivism and uses complaint data from a sales organization within an enterprise to explore Enterprise Architecture and Enterprise Integration challenges. With an anchor on adaptive capabilities and related concepts sourced from a literature review. These main concepts being Levels of Capabilities, the Adaptive Loop, shaping the environment and the limitations of EA modelling. It was found different processes have very different success rates and that different teams and customers interacting with or through the same systems may have varying degrees of process outcomes. Specialized, applications and process commitment by eliminating or focusing interaction options with core systems conceivably being key to ensure low failure rates. While having an agreed upon way of changing how things are done. Adaptive capabilities being at the forefront in such a case to ensure competitiveness. Shaping, rather than being shaped by the environment, requires the strategic imperative of learning and sharing to be widely adopted within an enterprise and collaborative networks. A proper balancing of resources and attention between the constructional or future state, with the functional or current state of an enterprise, can be difficult to maintain. Leading to enterprises facing various challenges rather than having the ability to create opportunities for change, with inherent capabilities the enterprise may have already developed.

Keywords:	Enterprise architecture, Enterpise Integration, Adaptability, Specialized Applications
Number of pages:	65
Language:	English
Date of acceptance:	26.5.2020

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

There is a body of research and insight that indicate that on a strategic level organizational adaptiveness is of supreme importance, this is epitomized in business literature in e.g. Red Ocean Strategy (Kim and Mauborgne, 2015) and Growth Platforms (Laurie et al., 2006).

Adaptation essentially means changing either an organization, or the environment around an organization, or both. When considering what hinders and enables adaptation there is several and various potential implements at play. E.g. Kim & Mauborgne (2015) in a Harvard Business Review article discussed the mental models and assumptions of management and argued that many times adhering to deeply held beliefs was so strong, that "neuroscientist think of them almost as automated algorithms that dictate how people respond to changes and events". Traps in this context were in a sense mental models which many times lead to a negative outcome. The point of the article being to ascertain how to create new markets in an environment where the markets are not growing, and where growth opportunities depend on taking market share from competitors. Further e.g. Laurie et al. (2006) also in Harvard Business Review argued that a business has certain core strengths which are not perhaps always evident. These being competencies and capabilities which can be used in other contexts. The authors argue that growth fueled by organic growth and acquisitions, do not sustain growth in the long term. People, operational, financial independence and access to organizational competencies and systematic development of growth platforms are the key variables emphasized by the authors.

1.1 Motivation for choice of research topic.

The challenge for enterprises, especially incumbents, is to create an organization capable of meeting ever adapting competitive forces around them. On a basic premise a successful business could be viewed as the sum of its people, knowledge and tools, and is where a company can find its future competitive advantage.

Enterprise Architecture (EA) can generally be considered as a structured and large collection of plans for the integrated representation of the business and information

technology landscape of the enterprise, in the past, current and future states. (Johnson et al., 2007)

There are many different perspectives used to describe EA, but they all describe it as a strategic instrument to control and manage complexity, the structure or description of the enterprise and its relationships. The outcome of an EA is to describe what a business does, how it operates and what resources it requires. Often these "artifacts" are presented graphically. The recognized benefits of EA are complexity management, faster adaptability, a comprehensive enterprise view, improved change management and increased interoperability and integration. Here one would note specifically, what arises from an EA is enterprise integration or interoperability. (Banaeianjahromi and Smolander, 2016a)

The most cited benefits of EA include reduced costs, a holistic view of the enterprise, improving the business – IT alignment, change management, risk management, interoperability and integration. The dimensions being the business, organization, information and technology. (Gomes, 2016)

The worlds of business and information technology and their alignment to create business effectiveness and efficiency, are key aims of any enterprise, and EA is one of the models and frameworks which are proposed to deliver these key achievements. (Vries et.al.,2012)

Thus, it is persuasive to use EA as an approach, providing the theory and concepts, to describe and research challenges that arise from personal work experience, which has a strong emphasis on cross-organizational information exchange. The thesis author, during extended employment in the enterprise being studied, has been or is actively engaged on continuous basis, with all the enterprise processes noted in the empirical research in a direct or indirect role.

1.2 Background

The structural patterns of research have been EA frameworks, design and operations of EA management and EA conception and modeling. As for the specific subjects meta-

modeling and IT landscape management. One of the areas for future research which has been proposed, is to place greater emphasis on business architecture management at the strategic level, standards management, integration with operational architecture management and what is termed, the general EA lifecycle phase beyond documentation. Further a focus to processes and organization might provide a basis for and better facilitate research, forging an ability to give more pragmatic advice and attract practitioners. Further it can be noted on some limitations, in that studies on the topic might be hampered by the issue that there is no precise definition of what constitutes enterprise architecture research, which is alluded to being due to the subject being abstract and broad. Many terms are used as substitutes to describe enterprise architecture. (Johnson et al., 2007)

Other further future studies suggested, has been exploring how EA modeling languages could be improved. This in order to produce a common and holistic approach to optimizing strategy concepts, as well as focusing on modelling other aspects of strategic management such as value chain and SWOT analysis, because limited efforts have been done regarding the modeling of these concepts. (Kitsios and Kamariotou, 2018)
It has also been noted that little empirical research has been done in the EA context (Banaeianjahromi and Smolander, 2016a). Further the concept of adaptability, in the EA context, is only an emerging research stream, where a recurring theme has been viewed as difficult to identify, but is described as "The enterprise co-evolution with its environment, design of dialogs and the empowerment of people are key aspects of this research stream.". EA is essentially used to tackle man made problems and communication issues. (Lapalme et al., 2016)

Based on what was found in the literature review, the main threads of EA research have been mainly qualitative by means of literature reviews, interviews, case studies and action research. On the quantitative side mathematical modelling of various processes and aspects has been a mainstay.

As for future studies on the topic, it was suggested to use empirical methods such as surveys and interviews to survey integration (EI) challenges in order to understand how EA can help enterprises in this arena (Banaeianjahromi and Smolander, 2016a). EA is

described, as noted earlier, as a holistic approach to the management of information systems and organizational approaches, in essence including everything from systems, stakeholders, relationships, dependencies and business strategy (Banaeianjahromi and Smolander, 2016a) enables an exploratory research approach.

1.3 Aim of the study

EA supports enterprise integration (EI) by enabling the company to model and define its business processes, data and systems across the enterprise and its partners. EA is one of the tools that could enable resilience becoming a more predictable factor and could be used in conjunction with other fields related to enterprise resilience, like risk management. Further, an approach of ecological adaptation, as a systematic approach alone, is not enough for enterprise design. An environmental and enterprise co-evolution is achieved by purposefully changing the environment, systematically designing the enterprise as well as its relationships to its environment. (Gomes, 2016)

Other viewpoints on the matter are similar, identified as a tentative term, enterprise ecological adaptation, is one of the alternative streams to add knowledge to EA. Its described as concerned with "fostering the capacity for innovation and adaptation within the enterprise, as a means to cope with complexity and uncertainty within and outside of organizations". Further it is noted as an eclectic stream, where a recurring theme is difficult to identify. The enterprise co-evolution with its environment, design of dialogs and the empowerment of people are key aspects of this research stream. EA has a strong focus on modeling and planning concerns, and there are considerations that it should strive to consider an organizations environment and stakeholders better, as well as aid in development of organizational capabilities and its ability for innovation. In summary its stated "EA is concerned with the design of sustainable organizations for the future". (Lapalme et al., 2016)

When considering IT-Business alignment a common viewpoint by users of IT, which is most stakeholders of an enterprise system, is skewed towards viewing IT as the stakeholder to support the Organization or Business. However, another viewpoint is considering whether the organization is supportive of the current IT capabilities. ("Based

on 25 years' experience IT is never good enough" - board member of an International Corporation). This is epitomized in an example where promises are made to customers which cannot be kept, because the enterprises IT capabilities do not support the intended action effectively enough and thus there is no IT-Business alignment. It is this dimension where IT intersects with business or organizational goals that is of interest and in finding ways to answer the challenges.

1.4 Research Questions

Constant changes in the environment are one of the biggest challenges of the modern enterprise, with a constant need to integrate into a changing environment. EA is a proposed solution. Enterprise Integration (EI) is defined as the task of performance improvement in complex organizations by managing the participant's interactions. Providing a discipline to organize all the knowledge that is required to identify and carry out change in the enterprise. The role of EA is that it provides appropriate concepts, methods, models and tools to facilitate business IT alignment and integration. (Banaeianjahromi and Smolander, 2016a)

The challenges of EA implementation are alluded to in many papers. Its perceived that an implementation project counters lack of support in requirements analysis, governance and evaluation, guidelines for implementation and continual improvement of EA implementation (Nikpay et al., 2017). Integration challenges manifest themselves in many different forms, one being failed execution of processes, this can be frequent or incidental.

This is an exploratory case study of enterprise integration challenges. Does the empirical data suggest adaptive or agile capabilities which would be evident from a high variance of complaint occurrences coupled with a steep positive trend, i.e. a lesser frequency of occurrence. Secondarily discussing based on a literature review the key points of an agile or adaptive enterprise architecture in the context of the findings.

One of the points of interest in this context, being how effectively different sales teams in a defined region use enterprise architecture and promote acceptance and utilization of sales processes, measured in frequency of customer complaints related to sales processes.

This will allow insight into the integration challenges and opportunities in the context of agility and adaptiveness when using EA as a framework, within the surveyed organization, which is part of a global supplier of parts, software and services. The data being gathered from one of its regional organizations.

The object of this study is one sales region with four different sales areas or teams, which function towards their own area of responsibility, sharing the same global IT systems and regional support functions. The additional value of studying the topic at this level at an organization with the empirical data at hand, is that different business models, systems and processes, which might be described as given, converge to be used within a defined organizational boundary. And thus, can give different and comparative perspectives on EA topics on a practical level.

Further for the purposes of the choice of the research object and questions, the following definition of enterprise architecture is descriptive, as to the purpose of EA, which is to "…enable the enterprise to reach out to people, facilitating all transactions and interactions with them. The systems constituting the architectural elements...driving these exchanges. They are visible...as tools and services to solve tasks and make decisions, as information assets, communication channels, and workflows. They take concrete form in physical and virtual spaces, in personal conversations, phone calls, or web-based transactions, enabling people to interact with the enterprise." (Guenther, 2013)

Thus, to study the state of abovementioned topics the following research questions (RQ) are defined:

RQ 1. What are the major sources of complaints?
What does it tell us about possibly major components missing in the enterprise architecture.

RQ 2. What is the level of variance of complaint occurrences on specific topics?

This might exhibit effective steps being taken to counter their occurrence, i.e. an adaptive organization.

RQ 3. Is there a variance in complaints from different customer groups or customers? This would indicate relationship or rather enterprise integration challenges.

1.5 Limitations

Though the actual act of modeling and associated issues is shortly covered incidentally, the topic is mostly outside the scope of this thesis. Where modeling is covered it is for illustrative purposes, in as the issues arising from it have bearing on the core topic, which is agility and adaptability of an organization in its IT – business alignment.

It is to be noted that adaptability is not in the sense the idea "customer is king", and thus would regulate the direction of movement towards, but rather that an enterprise is able to both respond where warranted and shape stakeholders towards a common framework of collaboration.

Further, given the definition of EA in the previous chapter, where essentially one might describe it is the data packets containing information flowing through an organization that give life to an organization, one may further that any interaction or movement of information be it via electronic data transfer or people could be a valid research object. However, gathering and structuring data outside defined database systems, which very often is unstructured and difficult to obtain is not necessarily needed to gain insight into the topic. Thus, complaint transactions are chosen as the research object, essentially comprising of outgoing invoices in the form of credit notes created for various reasons. A credit note might be created as part of the business plan, e.g. bonus payouts, or because of a business process failure. Looking at failures provides a more distinct look at deficiencies of an EA, rather than optimization opportunities of running activities, where the chosen transaction data for this research might be insufficient.

1.6 Theoretical Framework

Enterprise architecture, as alluded to earlier, is considered as a broad rather abstract subject. There are many different frameworks, concepts, themes and perspectives one can approach the subject from. A very basic premise of what EA can be described as, is creating a picture or representation of an enterprise and its future state. With appropriate consideration to change management topics. From the point of a practitioner or EA architect there is also a strong emphasis on the tools and methods used to create the representation of an enterprise. However, from the point of view of many associates working within enterprises, it is usually the outcomes that are of relevance and interest. One may argue that this thesis is based on that latter stakeholders' viewpoint, i.e. that of those whose work are in the end affected by the outcome of an EA on a practical level, in as how things are done in an enterprise. In a sense the "what and why" of the state of something.

The lead up to formulating the specific research topic within EA has been heavily influenced by previous work of Banaeianjahromi and Smolander (2016) and Gill (2015) introducing the concepts of enterprise integration (EI) and further by Korhonen and Halen (2017) and concepts cited of e.g. Nolan and Haeckel (1993) which discussed sense and response and capabilities. From a nuts and bolts perspective Hoogervorst (2004) provided an excellent overall picture of all the different aspects involved in enterprise operations, as a reference guide essentially in many of the critical components that need to be accounted for in IT-Business alignment.

Based on the literature review relevant concepts and themes were identified. The main ones being standardization and integration versus adaptation to a changing environment and sensing changes and the ability to respond. These are based on the concepts of "Levels of Capabilities", "The adaptive Loop" and the running system and motioning system (Korhonen and Halen, 2017) and shaping the external environment and the limitations of modelling languages (Gill, 2015).

1.7 Method

The method used was analyzing, by means of descriptive statistics, transaction data related to complaints handling to elucidate opportunities for improvement, in the context of EA and EI. The data gives an unbiased view of the actual results of the enterprises activities in the EA context. Information about the system architecture of the enterprise is drawn from the authors personal experience.

1.8 Definitions

Enterprise Architecture (EA): A strategic instrument to control and manage complexity, in its past, current and future state.

EA Modelling: Creating a structure and description of an enterprise, its components and relationships.

EA Dimensions: The dimensions of an enterprise modeled depend on modelling decisions and tools. They may contain e.g. the Business Processes, Applications, Data and Technology.

Enterprise Integration (EI): Uses EA tools to model and manage interactions with other Enterprises.

Enterprise Sensing (ES): Using digital tools to make sense of the environment and associated events.

Levels of Capabilities: Different levels or types of capabilities which allow delivering of certain outcomes.

Artefacts, diagnostic and actionable: An EA product, e.g. procedures or maps describing an IT landscape. Diagnostic artefact can be e.g. heat maps providing guidance to something, while an actionable artefact can drive change, e.g. an application ready to be used.

Make-and-Sell versus Sense-and-Response: Two different perspectives of what an enterprise should focus its activities on and how to organize itself

Functional and Constructional Perspective or Running and Motioning systems: The terms aim to describe the differences and relationships between the current and planned future state of an enterprise.

Management by Wire: Defines an Enterprise as an organization that has many structured conversations with different stakeholders and how it relates to a digital environment.

Transactional Data: EA seeks to enable and facilitate transactions which is of key importance to any enterprise.

1.9 Structure of Thesis

In the introductory chapters the current research and the broad concepts of EA and related concepts was presented. In the subsequent literature review, this paper goes into the practical workings of EA related themes relevant to organizational adaptiveness. Specifically, linking strategy to execution in this context, what is EA and EI and how they are tied to transactions and what allows, and influences change in this context. Further, modeling, practice and obstacles are covered and subsequently capabilities and practical concepts deemed pivotal in the EA and EI context for enterprises or networked collaborative networks, to have the ability to change and adapt. The method and using transactions for research data and the research results are covered after the literature review, followed with a discussion. The thesis ends with conclusions and suggestions for further study.

2. ENTERPRISE ARCHITECTURE

The basic premise of EA is covered the introductory chapters. The concept of EA has its beginnings in Business Systems Planning (BSP) methodology which was initiated by IBM in the 1960s. Though not playing a significant role in the formation of the concept of EA, one might still argue that it was popularized with the Zachman framework, which was first publicized in “The framework for information systems architecture“ in 1987. It is argued that it is the “conventional wisdom... that this was the seminal publication of the EA discipline”. The TOGAF 2011 framework is referred to as being the modern and most widely cited architecture framework referenced in literature and considered as a “de facto industry standard. (Kotusev, 2016)

Lapalme et.al (2015) discuss how “the act of architecting is very much about structuring ill-defined problems”. Further that enterprises “are man-made artifacts” which EA is concerned with designing. The best framework to use as a tool to solve potentially complex and ill-defined problems, as alluded to earlier also by Kitsios and Kamariotou (2018), are significant topics and further shortly discussed in later chapters.

2.1 Linking Strategy and Execution

Eliminating complexities due to different aspects related to the meanings of strategy concepts, inherent in different modeling languages within the EA field, is an area of study. Interaction between architects and stakeholders for example senior management, program project managers, designers and programmers are significant but frequently problematic. There are several tools to support EA, but implementation suffers from lack of comprehensive tool for maintaining whole perspectives of an EA project. Selecting the right or effective tool is a significant factor in facilitating successful implementation. This is because not all languages are appropriate in all cases. An organization may not know what his strategy is or may not be able to formulate it. There is also by researchers, a lack of identification of conflict situations that would arise during gap elicitation processes. For practitioners it would be important to answer the question "what support can enterprise architecture provide within business strategy, and on what conception of business architecture is this based". EA provides general guidelines for business to empower strategic goals by creating opportunity for change. (Kitsios and Kamariotou, 2018)

The worlds of business and information technology and their alignment to create business effectiveness and efficiency are key aims of any enterprise. EA being described as a strategic instrument to control and manage complexity, the structure or description of an enterprise and its relationships. Further as a holistic approach to the management of information systems and organizational approaches. Including everything from systems, stakeholders, relationships, dependencies and business strategy. (Banaeianjahromi and Smolander, 2016a)

For successful organizational change one of the most important aspects is coherence and consistency over the various business and organizational dimensions. The organizational architecture is the one that defines the behavioral context and as such is one of the more important aspects. It is argued that in changing employee behavior it should be in the behavioral context. Unlike with a functional perspective, a constructional or aspirational organization essentially deals with the design of the business, organizational, technology and informational dimensions of an enterprise. The ability to link all these aspects into an integrated design would constitute a competitive advantage. (Hoogervorst, 2004)

Figure 1 provides an example of a formal design of a system linking strategy and execution.

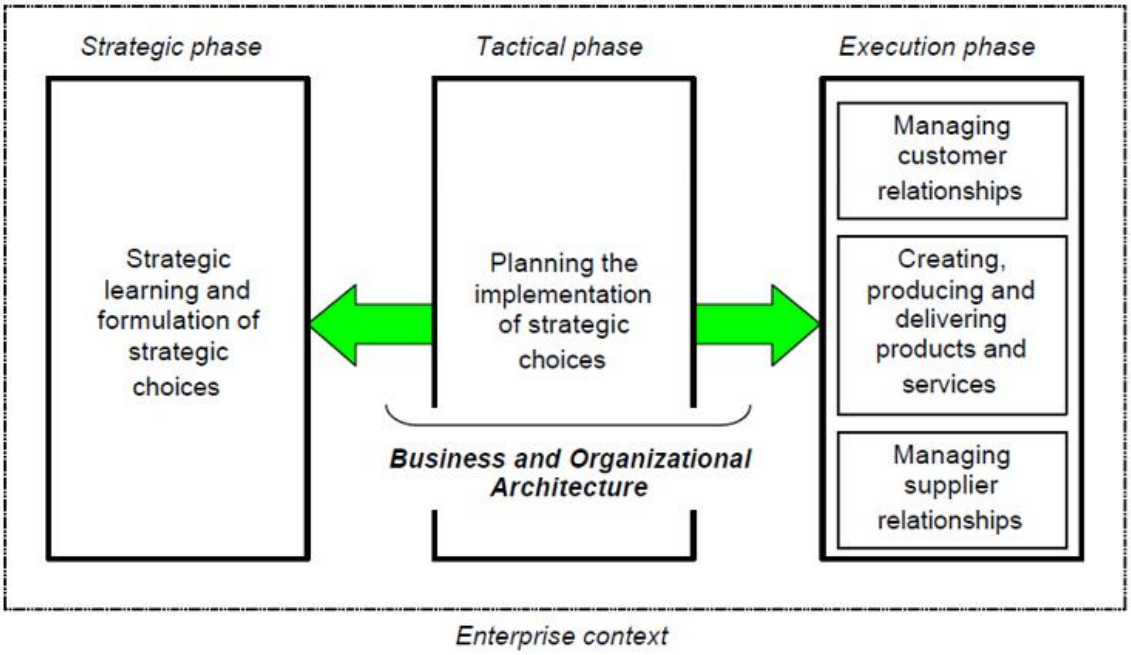

Figure 1. Linking strategy and execution through architecture (Hoogervorst, 2004)

The core perspectives which need to be addressed in enterprise design are identified in figure 2.

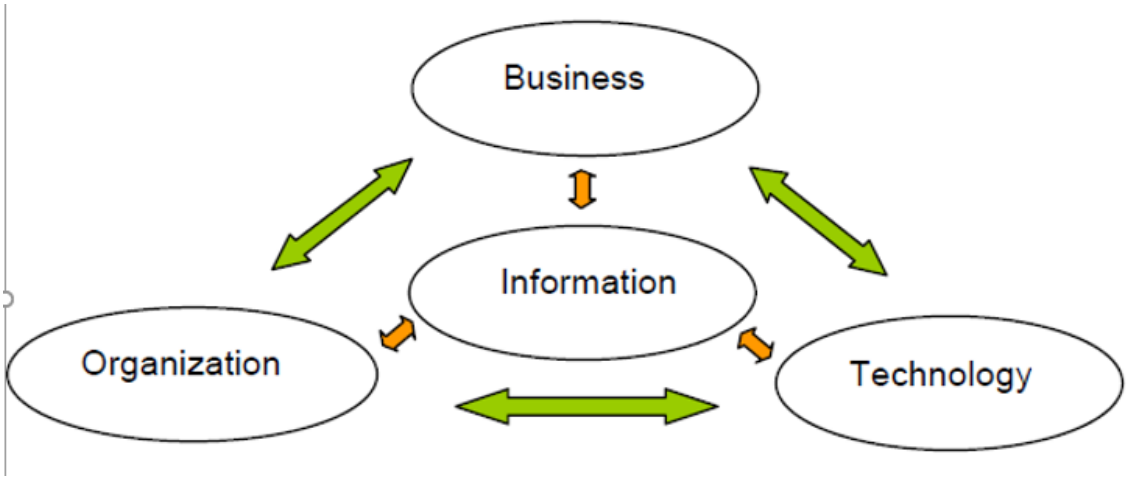

Figure 2. Domains of EA (Hoogervorst, 2004)

Further what the figure 3 illustrates is the business architecture perspective and how to address how purposeful and gainful activities could be exploited, explored and developed. (Hoogervorst, 2004)

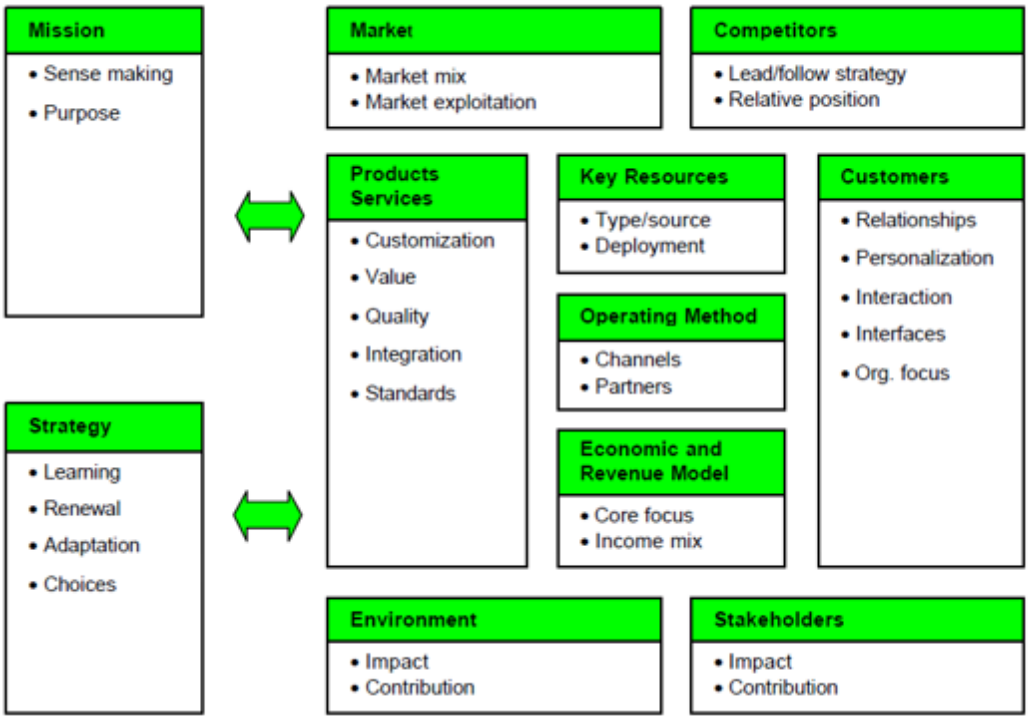

Figure 3. Business architecture framework (Hoogervorst, 2004)

Figure 4 shows how the purposeful activities could be organized, allowing some degrees of freedom in the means and methods. (Hoogervorst, 2004)

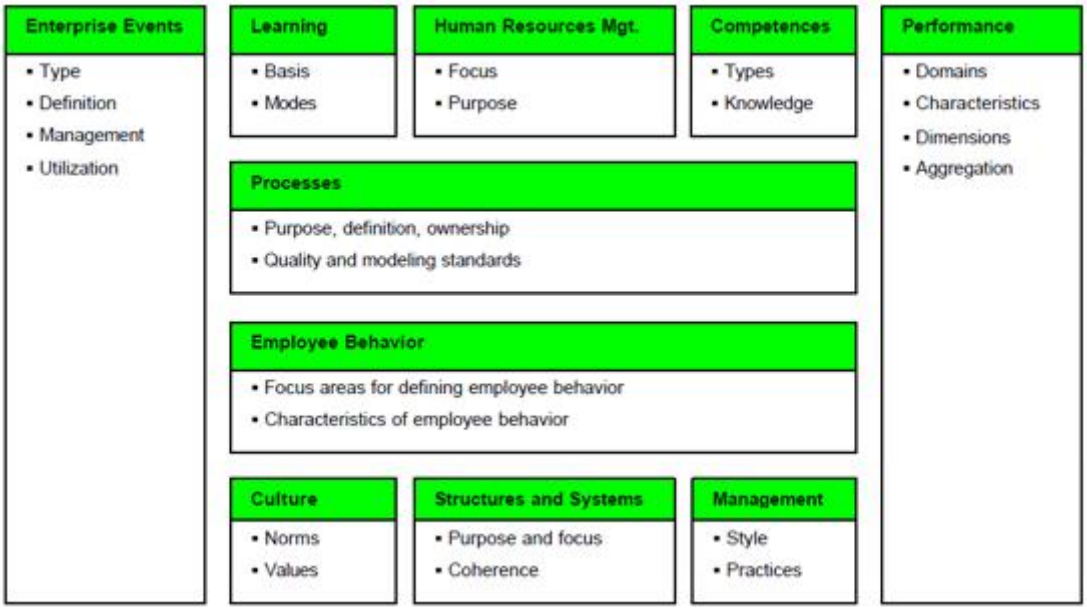

Figure 4. Organizational architecture framework (Hoogervorst, 2004)

Figure 5 shows the dimensions within the information architecture, which in many respects is in the core of an enterprise's activities. The figure is built from down to the top. The lower parts are a precondition for the meaningful use of information in providing its basic structure, its meaning and trustworthiness. The middle layer describes the operational aspect of information management, while the top layer is related to how to make value of the information. (Hoogervorst, 2004)

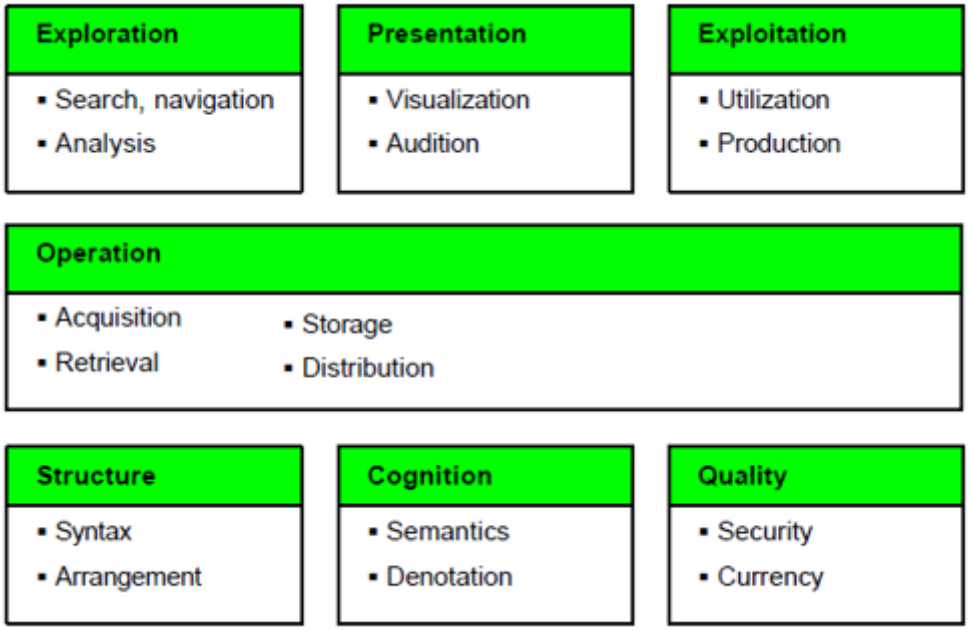

Figure 5. Information architecture framework (Hoogervorst, 2004)

2.2 Enterprise Integration

Enterprise Integration (EI) is a concept that seeks to apply enterprise architecture tools and methodologies in a collaborative context. In essence modeling collaborative endeavors where many different organizations are included, i.e. collaborative networks (CN). (Vargas, Cuenca, et al., 2016; Wang et al., 2014)

A CN consists of several different independent companies with their associated IT and organizational solutions, that collaborate for a common goal. For any enterprise, knowledge and thus the learning element is an important piece of gaining and sustaining competitive advantage. Additionally, the ability to learn and being able to apply that which is learned in an effective manner, is a key performance aspect. An example of a complex collaborative network can be any group of organizations engaged in for example

production planning, in such cases one single EA model may be difficult to develop. In production planning unexpected events affect normal planning and thus preparation for deviations is of importance to assure business continuity. The literature does not extensively discuss issues on how to consider managing different types of unexpected events in an integral way. (Vargas, Boza, et al., 2016)
Inter-sensing enterprise architecture is a concept where a collaborative network using information communication technology allows information sharing in support of business processes. In a well-developed and maintained collaborative network this adds value, enables innovation and boosts learning and knowledge. (Vargas, Cuenca, et al., 2016)

Sensors need not only be automated algorithms or system checkpoints but can also be humans, reporting observations or indirectly performing the role by engaging in various forms on e.g. digital social collaboration platforms (Kostakos et al., 2017; Wang et al., 2014). Such platforms can conceivably be either public or closed for the needs of the collaborative network for one or more enterprises.

In a systems of systems environment emergent behavior is defined as behavior of a system that does not depend on its individual parts, but rather on its relationships to one another. It arises from the cumulative actions and interactions of different parts in the systems of systems. These may be constituted by various components be it digital, human or rather human-machine interface and is nonlinear in nature. TOGAF is not perceived as suiting for environments with “loose coupling and emergent behavior characteristics“. However in this context EA is still useful and important in for example communicating business plans across an organization. This may entail e.g. sharing some form of EA product or schematic with for example customers or other stakeholders, with which enterprises are deeply involved with, and can enable better enterprise integration. (Bondar et al., 2017)

2.3 An Adaptive Enterprise

EA focus traditionally has been on process standardization and integration, rather than continuous adaptation to a changing environment in terms of business and technology (Korhonen and Halen, 2017). It is however continuously more important for enterprises to be able to adapt and integrate to its surrounding environment. Successful organizational

and business adaptation is only possible with supporting technology and other similar building blocks.

Because enterprise architecture is a broad concept it may be interpreted in many ways. As the saying goes when learning to use a hammer one might view all problems as a nail. In some viewpoints, enterprise architecture is used as a planning activity rather than as a development activity. Oftentimes two problems arise “Having a scope for the EA that is too large. This results in an EA that is too ambitious to be successfully implemented” or “having the EA burdened with a too low level of details”. A further point is brought up that EA rather than reducing complexity, may more be a tool to dealing with complexity. As organizations are systems in motion, also an enterprise architecture schematic must necessitate change and development on a continuous basis. (Gong and Janssen, 2019)

Standardization and integration is the stated benefit of enterprise architecture in many instances. Deduplication, though it may be inclusive of the former benefits, is worth mentioning separately (Foorthuis et al., 2016). I.e. the potential for reusability of EA artefacts, used elsewhere in an organization or a network, is enhanced with a common EA structure and may be a factor in enhancing adaptive capabilities. The potential for reusability may also improve the potential cost benefit aspect of developing certain capabilities that may be of future use, in some area of the enterprise or collaborative network.

Variability in the context of enterprise architecture has not been extensively studied. In a strict enterprise architecture modeling case, it is in some respects a matter of syntax and graphically representing variance in a modeling language or environment, which may not necessarily be built to account for variability (Rurua et al., 2019). If a planning tool does not allow variability, it will undoubtedly affect to some degree the considered and applied solutions to different problems with inherent variability.

2.4 Agile Modeling Versus Agile Organisation

As described in the previous chapter, an enterprises adaptation to a changing environment in terms of e.g. business and technology, is only possible with supporting tools. For these purposes modelling techniques are relevant.

Agile EA can be described as the ability to model EA components or the "fundamental concepts or properties of a system in its environment embodied in its elements, relationships and in the principles of its design and evolution". Further "Agile EA modeling techniques would suggest e.g. using informal tools like flip charts, whiteboards and sticky notes" to model the artifacts. However there is scarce research in agile EA modeling methods. Thus, what might be needed is adoption of situation specific hybrid modeling, as a precursor to establishing an overall modell, in an environment supporting comprehensive modeling of agile EA artifacts. It is argued that no one tool supports the purpose effectively and rather a hybrid and integrated approach is needed. Different modeling languages provide only limited perspectives on all components included the entire enterprise architecture. (Gill, 2015)

The limitations of different modeling languages is well represented in table 1, which is adapted from Gill (2015). Describes EA modelling consisting of three elements Business, Application and Technology architecture. Each modeling language has its own semantics, syntax and structure of different concepts in ontological terms. As well as inherent or varying capabilities to model the architecture on different levels of detail. Thus, for example transforming an architecture model from one language to another is not an automatic process and may require significant effort.

Element	BPMN	SoaML	FAML	UML
Business process/function interaction (business layer)	X			
Business service (business layer)		X		
Business object (business layer)				X
Application service, component and interface (Application Layer)		X	X	X
Data object (Technology)				X
Infrastructure service (Technology)		X		X
Node (Technology)				X
Artifact (Technology)				X

Table 1. Ontology of different EA modelling languages (Gill, 2015)

2.4.1 Obstacles to EA

In a study of obstacles to enterprise integration four relevant themes was identified, those being Environmental, Technical, Managerial and Organizational. These are presented in table 2. (Banaeianjahromi and Smolander, 2016b)

Themes	Identified EA obstacles
Environmental: *issues related to the inter- and intra-organizational environment, such as organizational culture and experience on EA projects and issues related to vendors and consultants.*	- Political issues of the government - EA consultant related issues - Outdated organizational statutes - Restricted rules in governmental organizations
Technical: *issues related to EA tools, infrastructure, outputs, and configuration.*	- Old infrastructure - Lack of change management tools - Ineffective EA outputs
Managerial: *issues related to EA visions and goals, management and leadership, project team and human resource.*	- Lack of management knowledge - Lack of management support - Constant change of management - Unable to set a common goal and understanding - Setting too ambitious goals - Unclear organizational strategies - Budget provision
	- Organizational structure deficiencies
Organizational: *issues related to EA training and educating personnel, communication and collaboration in the organization.*	- Personnel change resistance - Lack of personnel knowledge - Lack of communication and cooperation - Inefficient human resource department - High costs of training personnel

Table 2. Obstacles to EA (Banaeianjahromi and Smolander, 2016b)

The environment within which people are operating in and the tools they are given to accomplish the tasks have a high impact on productivity. In the EA context this means the information systems, technology, processes and business environment This means that "enterprise architecture can transform the structure, culture and social environment of an enterprise". (Mezzanotte and Dehlinger, 2012)

Enterprise architecture frameworks do not always consider the sociological landscape and human behavior within enterprises. Many of the reasons cited towards enterprise architecture initiatives failing to reach all its objectives are related to issues like poor communication, lack of leadership and internal support, as well as lack of technical and business knowledge and change management challenges. Something epitomizing these challenges are what may be, or perceived as, hidden aims. E.g. an introduction of some new system or technology may be intended to lessen the bargaining power of some structures within an enterprise. The redistribution of power may even be a major motivation behind many IT-based changes (Flynn and Hussain, 2001)

2.4.2 The Practice of Architecture

Some of the challenges faced by organizations in their EA activities are being focused on only certain aspects of the architecture in isolation to the other aspects. E.g. doing activities only in the technology or IT dimension, excessive governance and assurance may as well lead to other parts of the organization, necessary for success of an EA program, to become averse to engaging in the endeavor. Focusing on the current state of pain points and problems of the existing systems, conceivably with the risk of it leading to only tactical fixes rather than transformative, which are conceivably those that provide most value. Other examples of pitfalls, which are relevant to adaptability to the highest degree, are “creating a standard for everything“, “get engrossed in the arts and language of EA rather than business outcomes”, And the sense of “we're done” which is related to the sentiment that EA in some cases may be viewed as a project with a start and end date, rather than an overall, continuous an iterative effort. (Brand and Burton, 2016)

It has been argued to extend the formal design of an enterprise to other systems than only technology. The additional architectures being the business, organizational and information architectures. Described as the core imperative for modern enterprises is “seamless integration of customer and operational processes, agility, and the ability to change.” While further, viewing organizations as complex adaptive social technical systems. An interesting concept is two fundamentally different perspectives, one being the functional and the other being constructional. These also termed black and white boxes, in that only for the constructional perspective, is knowledge of a systems design and operation required, i.e. in the white or visible from the outside. The functional perspective facilitates management and performance, while the constructional perspective facilitates change and design, one might be seen as a descriptive concept while the other being prescriptive. (Hoogervorst, 2004)

As the three main critical success factors, distinguishing successful EA programs or implementation, use of formal methodology, consultation and communication and commitment to the use of architecture are most widely cited. While strategy for the development of architecture, monitoring, compliance and use of architecture tools, are less often cited. The success of EA programs comes from 'how' architecture is practiced more than from 'what is' practiced, i.e. related to the process of EA implementation rather

than those associated to its signature development tools. Further "suggesting that the methodological skills of architects need to be supplemented with an understanding of practice." (Hope et al., 2017)

2.4.3 Agent Based Modelling

Agent based modeling is an approach of modeling systems which are composed of often self-organizing, emergent order or behavior creating, autonomous and interacting agents. In agent-based models one can include the behavior of human and digital agents and can be used to observe the collective effects of the behavior and interactions of the agents. (Macal and North, 2010)

Work processes and systems overall generally do not necessarily consider the human interface as part of the design, "setting people up for failure". I.e. where failures are associated with people working with systems these are many times identified as human errors. But "human errors are not random or isolated breakdowns, but rather are the result of the same processes that allow a systems normal functioning". Though it is people who, while potentially causing problems, in many cases enable flexibility and the capability to react to unexpected situations. (DeMott, 2014)

When looking to mitigate such issues often what is looked at as measures pertain to, e.g. disciplinary and accountability topics, communication and collaborative initiatives, policies and procedures and organizational culture. However, identifying potential areas and causes for human error and trying to mitigate the risk for those in a system, by design, using appropriate methodologies may in some cases be a more appropriate approach.

2.5 Capabilities of an Adaptive Enterprise and CN

Capability-based planning (CPB) is a recent trend in enterprise architecture practice. CPB may though fall short in the face of unpredictable change. CPB is a technique for planning of investments and capabilities that would help achieve business outcomes specified in strategy, facilitating informed governance and steering of change, this being a top down mechanism for driving a business plan. Any capability development would take an extended time to deliver and would need to provide a business value to stakeholders.

From a practical point of view achieving the capability is broken down into increments that “deliver discrete, visible and quantifiable outcomes”. Enterprise change may take several different forms for example it may be premeditated and top down driven, spontaneously self-organized bottom up, proactive in anticipation of value opportunities or reactive to value crises. (Korhonen and Halen, 2017)

What are termed diagnostic and actionable artifacts may provide better outcomes to IT investment decisions then ones providing insight and oversight. These actionable and diagnostic artefacts would be “heat maps, policies, roadmaps, business capability models and landscape diagrams”. A “heat map is a typical example of a diagnostic deliverable. Actionable deliverables are signature-ready deliverables that directly drive or guide change by initiating projects or providing direction to change projects”. (van den Berg et al., 2019)

Organizational capabilities which are perceived to enable organizational agility or adaptability, are enterprise system enabled sensing and responding, as well as competence in creating systems allowing the above. Agility would have to be consciously developed by organizations when they combine different organizational resources, with information systems being one of the most valuable. For these, three different perspectives can be distinguished. The facilitating view which indicates agile organizations and agile information systems are the same thing. In the inhibiting view it is argued that information systems cannot create agility because they are built to help enforce control and efficiency, as well as due to being complex. The neutral view “maintain that, information system can either enable or inhibit organizational agility depending on agility gaps”, and that it is mismanagement rather than the systems themselves that are what negatively influence agility and thus inhibit it. (Trinh-Phuong et al., 2010)

As the impact of enterprise systems on organizational agility is not necessarily direct, organizations may need to transform enterprise system resources to develop agility enabling Enterprise Sensing (ES) capabilities (Trinh-Phuong et al., 2010). Below follows a description, with figure 6, of the building blocks of a conceptual framework, with the facilitating view from Trinh-Phuong et al. (2010). Further the constructs, which the authors propose as to how the building blocks are connected is described.

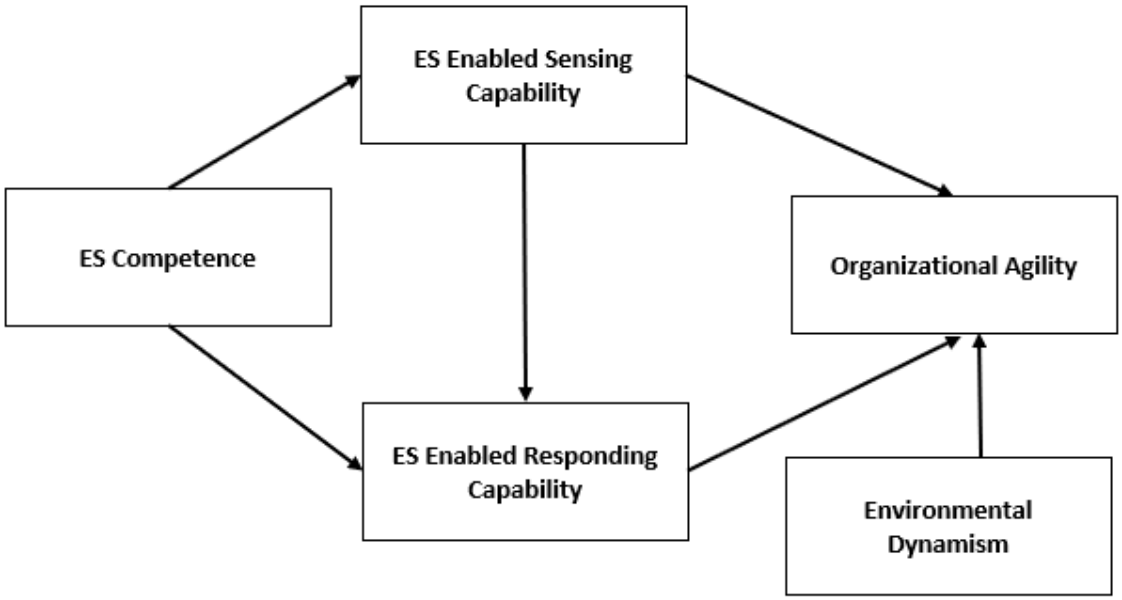

Figure 6. Conceptual Framework of how ES can lead to Organizational agility, adapted from Trinh-Phuong et al. (2010).

The model in figure 6, begins from **ES Competence,** which refers to the "quality of the ES infrastructure or the ability of the infrastructure to support design, development and implementation, and distribution of information across organizations." Linked to **ES Enabled Sensing Capability** and **ES Enabled Responding Capability** as "organizations that have developed high level of ES competence are more likely to exploit that competence", in order to build their ES-enabled sensing and responding capability. ES-enabled sensing capability refers to "the ability of an organization to quickly and efficiently utilize its ES to digitize the process of sensing and develop a strategic market foresight about its business environment." Further "higher enterprise systems-enabled sensing capability is more likely to lead to higher enterprise system-enabled responding capability" which entails **"a**n organization's capability to deploy its ES resources and embed them in its strategies and processes to quickly and efficiently respond to changes". Subsequently "organizations that utilize enterprise systems (such as ERP, CRM, SCM) in building and renewing their sensing and responding capabilities are more likely to become highly agile". Thus, these lead to **Organizational Agility** which is "the business performance of an organization that excels in utilizing its resources in order to quickly sense changes from its business environment and respond to those changes appropriately." A moderating factor to this is **Environmental Dynamism,** it is related to the industry operated in and essentially entails that a "stable environment requires

different levels of agility from a fast-changing environment". The connection between agility and dynamism is conceived as being due to "organizations that operate in fast changing environments where product shelf life is short are more likely to develop high ES competence and high ES-enabled sensing and responding capability than those that operate in a relatively stable environment." (Trinh-Phuong et al., 2010).

Another factor providing perspective is capabilities of an enterprise. In a study by Korhonen and Halen (2017) based on an integrative literature review, six levels of capabilities were identified. They were identified, rather than forming a hierarchy, as capability types, while also determining their "competitive focus, propensity to change and fundamental mechanisms of action".

The capabilities as described by Korhonen and Halen (2017) follow:
1. **Zero capabilities** are elementary activities and the minimum requirements for an acceptable level of business operations and do not provide any competitive advantage.
2. **Routine capabilities** are the basic functional activities of an organization and focused on day-to-day business tasks. The authors argue these capabilities have some impact on competitiveness.
3. **Systemic capabilities or dynamic functional capabilities**, relate to "repeated process or product innovations, manufacturing flexibility, responsiveness to market trends and short development cycles." These are summed up as the ability of an organization to complete its tasks utilizing a set of resources.
4. **Creative capabilities** enable organizations to recognize intrinsic value of different resources or developing novel strategies. They are also termed as dynamic learning capabilities which extend modify or create ordinary capabilities.
5. **Strategic capabilities** allow organizations to use their creative capabilities and a specific type of strategic capability is the capacity to learn. The ability to reinvent the organization and competencies is also referenced as a strategic capability.
6. **Adaptive capabilities** allow organizations to "quickly respond to and effectuate change in addition to environment to ensure its effectiveness in a shifting context". These capabilities allowing organizations to be more competitive in a highly turbulent environment, than utilizing the strategic capabilities. Adaptive capabilities are described

as “enabling quick creation of new knowledge and improvised response to rapid, unpredictable and novel events”.

2.5.1 Designing or Adapting

A systematic and successful adaptation could be designed around something termed the adaptive loop, which consists of four generic phases according to Noland and Haeckel (1993) and Korhonen and Halen (2017). These are:

1. Sensing changes in the systems environment and in its internal states
2. Interpreting these changes in their context
3. Deciding how to respond
4. Acting on the decisions

These are intended to allow the organization to leverage a sense and response approach based on customer pull, rather than a production and marketing push. With capabilities and resources organized in a modular fashion, dispatched on demand rather than by planned and scheduled responses. (Korhonen and Halen, 2017)

What is also an important aspect to consider is, that an organization might actively seek to influence its environment in the EA context. And thus, rather than interpreting and sensing the external environment and changing with it, actively shaping its environment through various means of influencing. (Gill, 2015)

Make-and-Sell	Sense-and-response
Business as an efficient mechanism for making and selling offers to well-defined market segments with predictable needs	Business as an adaptive system for responding to unanticipated requests in unpredictable environments
Repeatable processes, replaceable parts, standard job definitions	Modular products and services, modular capabilities that are linked to create customized responses
Economies of scale	Economies of scope
Centralized planning	Decentralized decisions within a shared context
Functional and sequential activity	Networked and parallel activity
Functionally managed and optimized	Unified enterprise view
Strategy as plan	Strategy as adaptive business design

Table 3. Make-and-Sell vs Sense-and-Response (Korhonen and Halen, 2017)

To conceptualize a system for transformation from the present to the future, a running system and motioning system as developed by Proper (2014) has been envisioned by Korhonen and Halen (2017). The concept of enterprises being in constant motion is epitomized by Proper (2014) in e.g. the principles of the enterprise facing competitive forces, shifting powers in the value chain, governance requirements and demands for efficiency. Thus, generalizing enterprise change to the idea of organizations being in motion. Further breaking it down to the running system governing the production of value in the present and the motioning system steering the production of value for the future. The principle of steering in this context being important, as it gives benefit in providing a means to orient an organization from its actual to its potential value generation. (Korhonen and Halen, 2017)

It is this relationship between these two systems as it were, that are among the key factors for successful IT investment decisions. It can be said “There is a positive relationship between the maturity on relationship to the as-is state and the percentage of actionable and diagnostic EA artifacts that are used in the preparation of IT investment decisions”. The principle that collaboration between different stakeholders is essential, is epitomized in this issue. (van den Berg et al., 2019)

It might be summarized in the idea that planning and preparing for changes allows an organization the possibility to design opportunities, rather than adapt to challenges.

2.5.2 Managing Conversations

Managing by wire is a concept where the core component is systematically improving institutional ability to respond to the complexity and speed of change in the marketplace, originally introduced by Nolan and Haeckel (1993). Empowered and decentralized teams need a unified view of what is happening within an organization and "blockbuster applications and network connections" are not enough. Enterprise governance is envisioned to be codified in two models, one being "how we do things around here" and the second more importantly "how we change how we do things around here". (Ing and Simmonds, 2000; Nolan and Haeckel, 1993)

One way of defining an enterprise in this respect, is the notion that business activities could be viewed as an operating enterprise having many structured conversations with many different partners. In this respect to the information infrastructure seven key design considerations are considered according to Ing and Simmons (2000) and Nolan and Haeckel (1993) which are:

1. Need to incorporate the notions of commitment and accountability. Essentially meaning communications being in writing and commitments understood and adhered to.
2. emphasis on outcomes rather than means or processes
3. Real time informational representation of the status of something.
4. Information representation should reflect the enterprise design. In essence this would mean enhanced lateral coordination.
5. An organization may participate in many enterprises. As activities cross organizational boundaries mechanisms to link to external partners are needed.
6. There is a necessity for accessibility to at least parts of the informational representation of something throughout the extended enterprise and across organizational boundaries.
7. A design should support organizational learning.

3. METHOD

Formal theoretical foundations and associated paradigms have not been formalized in EA research. Hence paradigms and research methods may need to be found in related disciplines, one of these being e.g. Information Systems research. While "adopting a particular epistemological stance may bias the researcher towards particular research methods". (Noran, 2016)

As described by Noran (2016) the mainstream ontological assumptions in enterprise architecture research, can be classified into the following assumptions:
The Information system: A technical system and social system.
Data: Constitutive meanings, partially descriptive facts.
The Organization: Interactionism, structuralism to some extent.
Human beings: Voluntaristic, with deterministic elements.
Technology: Human choice with deterministic elements.

A case study can be done in an interpretive fashion, in order to explore and generate theory, dually with a positivistic way, to infer theory, testing proposed EA artifacts (Noran, 2016). Positivism is the scientific study of the social world, aiming "to formulate abstract and universal laws on the operative dynamics of the social universe" and all laws in this respect are systematically to be tested to the collected data (Turner, 2001). Further, for case study research in information systems, data collected can be quantitative, i.e. descriptive numbers and tables. It is also used for theory building and testing. (Shanks and Bekmamedova, 2018)

The lack of more formalized research paradigms and multitude of different perspectives in the literature, undoubtedly increased the difficulty in adopting a suitable research approach. However, the scope of the topic necessitates combining both the interpretivist and positivist approaches to understand the data in the EA context. The differences between interpretivism and positivism are described in Table 4.

Assumptions	Positivism	Interpretivism
Nature of reality	Objective, tangible, single	Socially constructed, multiple
Goal of research	Explanation, strong prediction	Understanding, weak prediction
Focus of interest	What is general, average and representative	What is specific, unique, and deviant
Knowledge generated	Laws Absolute (time, context, and value free)	Meanings Relative (time, context, culture, value bound)
Subject/Researcher relationship	Rigid separation	Interactive, cooperative, participative

Table 4. Differences between interpretivism and positivism (Akanksha, 2018)

The Subject/Researcher relationship being participative is evident in this respect as to the method, in that some data presented is from personal experience within the enterprise studied, this being specifically the issue of Enterprise Applications. It is further presented in chapter 4.4 in the Results chapter. The data, i.e. namely the transaction data, gathered is objective, there is though a socially constructed aspect in the interpretation, this topic is also likely evident in the focus of interest. While the goal at onset is, undoubtedly in this case, seeking explanation with strong aim for predictive results, interpretivism is present.

3.1 Transactions are Facilitated by EA

Facilitating transactions are key design aspects of EA (Guenther, 2013; Ing and Simmonds, 2000). And EA is relevant for EI (Banaeianjahromi and Smolander, 2016a; Gomes, 2016).

Transactional data is related to the operations of an organization and is relevant to where value or information is transferred, changed and captured. Transaction data is strongly inter-related to master data, in as in transaction master data is referred to. Master data is not supposed to be needed to change for each transaction. However master data may become transaction data where master data is created and changed with a certain frequency, e.g. increase of fixed pricing, change of long-term customer conditions. (Borek et al., 2014)

Whereas typically business transactions are between two parties, master data tend to be used and influenced by more stakeholders within organizations, e.g. sales, marketing and

sales execution operations (Borek et al., 2014). Were one would have access to such master data related transactions an enterprises internal process and systems landscape can be surveyed in the same manner as any business transactions. Thus, it can be deduced that studying transactional or changing data in an organization can provide valuable insight into the functional perspective of the interrelated domains of enterprise architecture, i.e. business, organization, technology and information. Hence complaint data is valid when viewing an organization from the constructional perspective as it gives insight into the past or current system.

Extracting master data indicating the transactional dimension for this study, might have been possible and provided valuable insight, however in such a case, the research topic would have had to be very specific as the workload associated with extracting data related to changing master data, might have been significant. However, the results will give some understanding upon the issue. Looking for "…practical relevance unavoidably, implies a means-end approach", thus leading to an interpretivist approach being appropriate for EA research (Noran, 2016).

3.2 Data Extraction, Categorization and Analysis

The analyzed data is customer complaints registered and acted upon related to sales and distribution transactions. The data set was extracted in May 2019 and contained about 10,000 entries, spanning from 2012 up to May 2019 from sales and distribution operations of an enterprise's regional sales organization. Furthermore, data from the years 2012-2013 was subsequently excluded, due to data deficiency, i.e. data had been partially purged from the productive system due to archiving rules. The five months for 2019 was as well excluded due to it giving only a partial picture of a full calendar year that the remaining data gave for comparison. The organizational type of the enterprise is a matrix organization. The data was extracted from a productive SAP R/3 ERP system with the intent to explore and find patterns which may be relevant to business performance, here defined as efficient execution of functional activities. For this part no previous relevant literature was found that would be useful to base the work and analysis upon, and thus will rely on basic statistical methods and an exploratory approach to ascertain what might be interesting in the data set.

While the virtue of having access, to an extensive database in terms of the quantity and time scale of wholesale distributor customer complaints about process outcomes, is a factor in choosing using said data, it also makes sense from a theoretical standpoint. Specifically, as an indicator of organizational performance, giving a picture of problems and failures of various internal processes. And thus, a valuable source for diagnosing and learning of organizational weaknesses (Filip, 2013). What the data does not show is complaints or signals of a general nature where customers would want or wish for a certain improvement of a process or service. There was no knowledge management system and processes as described in what was found in the literature review (Chan, 2009). As transaction data can be used to elicit information valuable from the functional to constructional perspective, or the productive to the in-motion systems, process failure rates can thus be a measure of IT-Business alignment.

From the data three major sales processes were identified. These being sales of parts, subscriptions, and services. Parts can further be broken down into direct and indirect sales. The indirect being one product group supplied directly from a third-party, but sales executed (i.e. order cycle interface using data from third party) through the direct party. Thus, sales transactions were categorized as follows:

1. Direct Sales
2. Indirect Sales
3. Subscription Sales
4. Service Sales

The raw data was categorized according to sales process and further arranged into process areas, described in table 5.

Process	Further Description
Service Sales	Customer order
Service Sales Process Execution failure	Invoice correction, related to prices, or billing partner

Subscription Sales	Customer order
Subscription Process Execution failure	Invoice correction, related to prices, or billing partner

Indirect Sales	Customer order
Indirect Sales Process Execution failure	Price correction

Direct Sales	Customer order
Direct Logistics Failure	Warehouse and transport
Direct Return of goods	Reverse logistics, causee by warehouse or sales issues.
Direct Sales or Logistics Process Execution failure	Miscellaneous, minor or incidental
Direct Sales Process Execution failure	Price corrections

Table 5. Categorizing of Research Data

As data reflecting processees may be sensitive (Noran, 2016), in the presentation of the data and results this aspect is taken into account. E.g. the spread of something is provided but not the absolute values. The data being historical also means its sensititivity is lessened.

In volume, most sales transactions were from direct sales. Each transaction constitutes a sales order, monetary value or number of order lines is not considered. Master data is directly maintained, but not necessarily directly controlled, by the enterprise. In all but direct sales, there is an element of master data that needs to be maintained which is instructed upon by a collaborative partner. This is an especially vital topic in the context of subscription sales. Enterprise Integration may also involve electronic exchange of order confirmations, dispatch advises, and invoices and users of the electronic reverse messages are more likely to make use of such data. This data though, is not available in the dataset to analyze. The topic of Enterprise Applications available in the activities is included in the last Sub-chapter of the Results. It is informed by personal work experience, by nature of the subject/researcher relationship being participative.

The charts and tables based on statistics in the Results section were compiled using Microsoft Excel and the inherent Pivot table functionality, due to existing familiarity with the tools. The coefficient of variation (Insee, 2016) was calculated by taking the standard deviation (Excel formula STDEV.P) and average (Excel formula AVERAGE) for each category being examined and dividing them. Results was formatted as a percentage.

STDEV.P was chosen in order to account for the entire relevant dataset for each category.

4. RESULTS

Results are presented in four sub-chapters. Starting from variability in terms of sales transactions indicating potential workload distribution and complaint rates to the four identified sales processes.

Generally, a spread was found between the sales areas. This being of interest as each sales area has different customers and its own dedicated sales teams, which all share the same supplier systems and support functions. Across all sales areas the portion of orders transmitted via dedicated electronic channels to manually entered (i.e. received via Email, fax, phone) had increased. Though in 2018 the use of integrated electronic means of order transfer still ranged 24% from, in this context, highest performing sales area to the lowest. High frequency of electronic orders, which is assumed to correlate to a higher rate of electronic order data exchange in general, did not eliminate or decrease logistics and sales process failure in any significant sense, indicating a degree of integration challenges elsewhere than in only the means of order transmission and associated topics.

4.1 Variability of Sales Transactions

The data on sales transactions does not give any indication as to performance. It is desirable to have a small amount of sales orders with as high an amount of order lines as possible, as this maximizes efficiency. Further any data giving any insight as to more precise numbers was not included, due to the sensitivity of the data as described by Noran (2016), and as the purpose of the figures in this chapter is only to indicate potential change and variance in workload. Direct sales transactions in Figure 7, over the period studied, has not varied very much. Rather most sales areas have a stable level of inbound transactions. Direct sales had the highest volume of sales transactions.

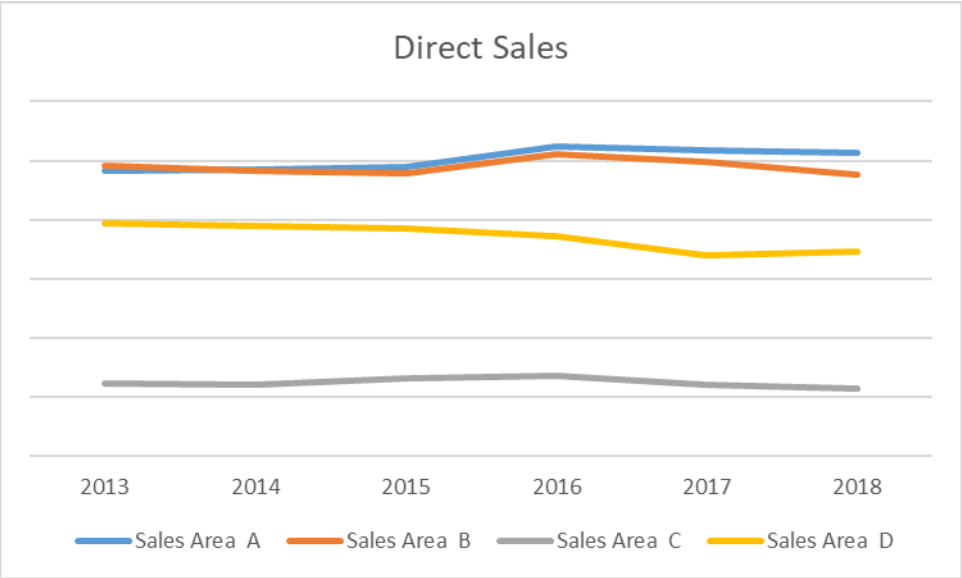

Figure 7. Direct Sales

Subscription sales has also been constant, presented in figure 8. The high point from 2013 is from a database maintenance activity where existing subscriptions were redone into a new subscription type, and a such is not relevant in this context. Inherent in the process is changes of master data, that may result in credit notes needed to be generated. The amount of such changes as referenced earlier was not accounted for. Thus, the rate of complaints to new subscriptions which is covered later with figure 11 is high. It does nonetheless present the pattern of the issue, when considered in context to the other sales processes.

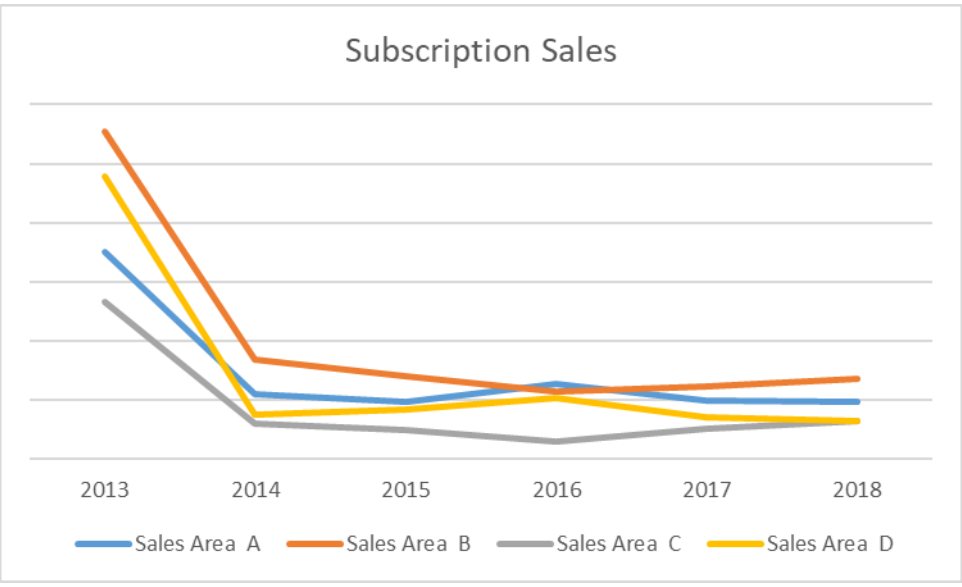

Figure 8. Subscription Sales

Indirect Sales, figure 9, has experienced a higher variability in comparison to the previous processes, in diverging sales areas.

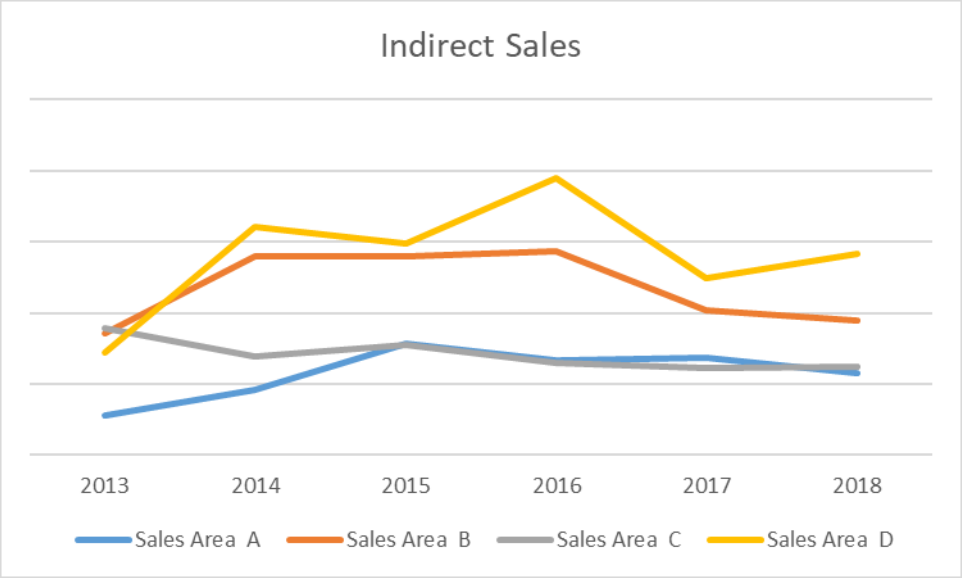

Figure 9. Indirect Sales

Service sales, figure 10, are converged except for one sales area with a significant increase in sales transactions. It is evidence of extraordinary sales activity in the sales area.

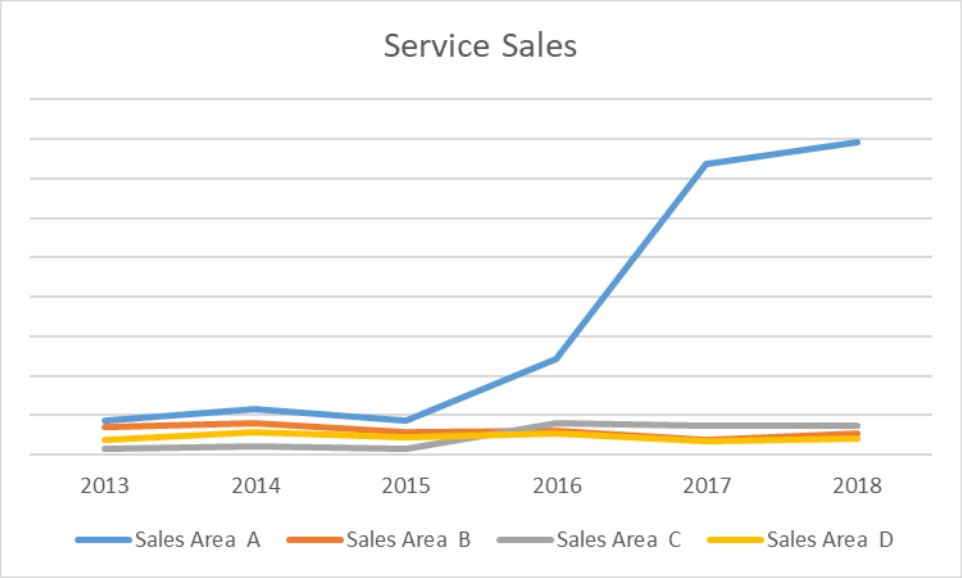

Figure 10. Service Sales

The variability in sales transactions is relevant when considering the complaint rate, in as if it is fixed to the rate of inbound orders or then variable, it is more likely dependent on incidents with an operational aspect or sales actions, e.g. campaigns, special deals,

unexpected events etc. Both being relevant in an EA context. From the results presented in following sub-chapters it can be said there is, in most of the cases, not a general direct link between overall volume or rate of inbound transactions to complaints, and thus is not a direct workload related issue.

4.2 Complaint Transactions

Below follow the results of each identified process in the context of its failure rates, with further descriptions and a context for the results.

4.2.1 Subscription Sales

Subscription sales have a significant and varying execution failure rate. Figure 11 gives complaints per each new subscribing customer. It was found to be difficult to compare the occurrence of invoice corrections to the amount of subscriptions. They may be running for several years and include additions and cancellations of single subscription lines within a contract, of which there may be several for one end user customer record. Which is in turn billed through a wholesaler. Thus, master data changes can with some frequency and is an inherent component of the process. So as also shortly discussed in chapter 3.2 in Methods and 4.1 in Results the numbers are only indicative, but nonetheless give paint a picture of the process outcomes.

In the data only new customer creations with associated subscription components and overall credit notes have been accounted for. Despite the lack of more exact data, a stark picture emerges. E.g. for Sales Area A in the year 2017 for every new 100 subscriptions entered, 74 credit notes were generated. For every new subscription in the dataset, on average, 40% credit notes were created, with an outlier of 54% with the others less but close to 40%. Though when considering all the other maintenance activities being performed this number would undoubtedly go down. Estimating that true number is not possible with current data.

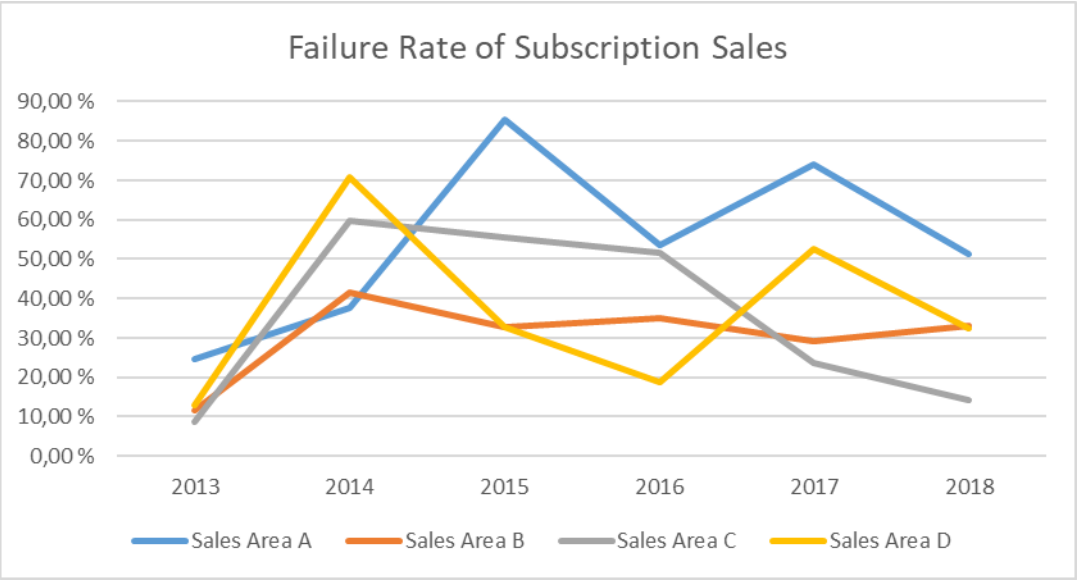

Figure 11. Failure Rate of Subscription Sales

4.2.2 Service Sales Orders

In absolute terms, the overall number of service sales transactions has consistently gone up while execution failures have dropped both in absolute terms and in relative terms. With one sales area peaking, it is associated with a significant increase in sales transactions.

Failure rate of Service sales in figure 12 have been markedly low, comparatively. Additionally, it has gone down significantly over the years. There is to be noted a variance between the different sales areas, though in 2017 they converged to very low levels. To be noted is that the extraordinary sales activity in Sales Area A did not result in a corresponding increase in complaints, where there was an increase in Sales Area D).

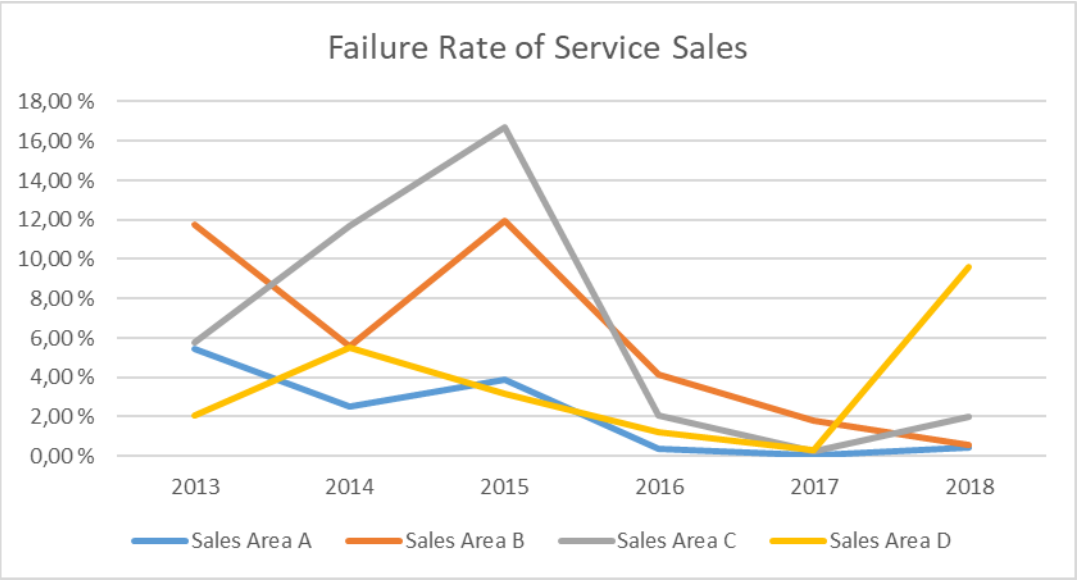

Figure 12. Failure Rate of Service Sales

4.2.3 Indirect Sales

Indirect parts sales transaction failure rates, shown in figure 13, have a significant rate of complaints with only marginal and temporary drops. Master data being indirectly controlled by a third party, i.e. maintained by the enterprise, with information relayed from the 3rd party. The failure rate is not directly related to the volume of sales transactions. E.g. Sales Area D has consistently had a high rate of transactions but not consistently the highest failure rate. Sales Areas A and C have the lowest portion of orders. There is no specific issue in the data to suggest a reason for the year on year divergence. It is noticeable that both indirect and service sales have noticeable converging drops during overlapping years. For Service sales it coincides with a significant increase in sales transactions.

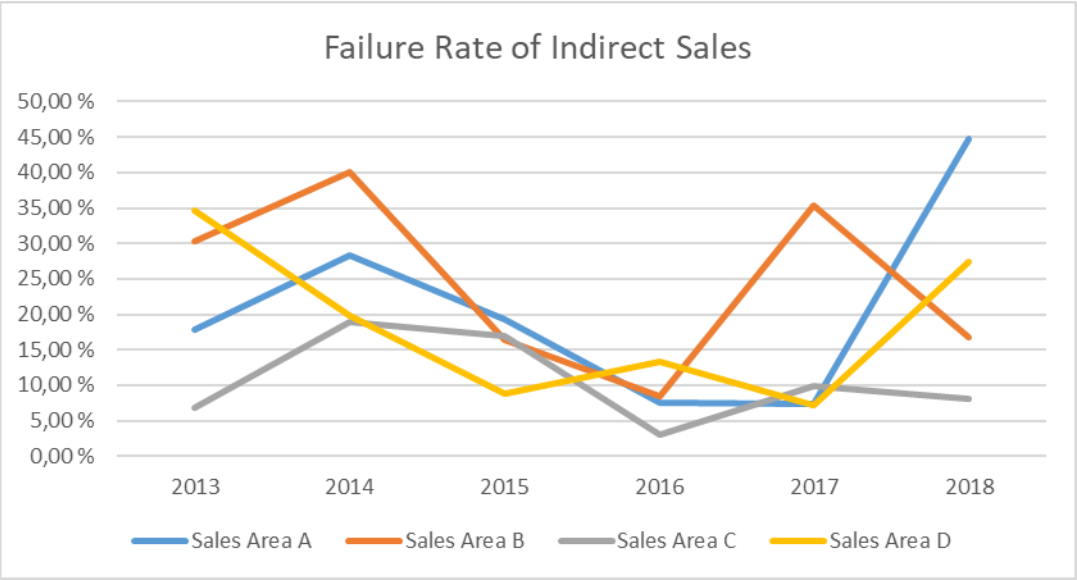

Figure 13. Failure Rate of Indirect Sales

4.2.4 Direct Sales

A peak is present in all instances when comparing orders to a complaint type, concerns Sales Area C, but for different years and complaint reasons, i.e. price and returns in figures 14 and 15. Miscellaneous complaints being an exception shown in figure 16. It may indicate returns made with a sales reasoning, rather than due to an operational reason, like a warehouse mistake. Other than a peak for one sales area the price corrections to orders is, comparatively judged, collected and stable except for an outlier.

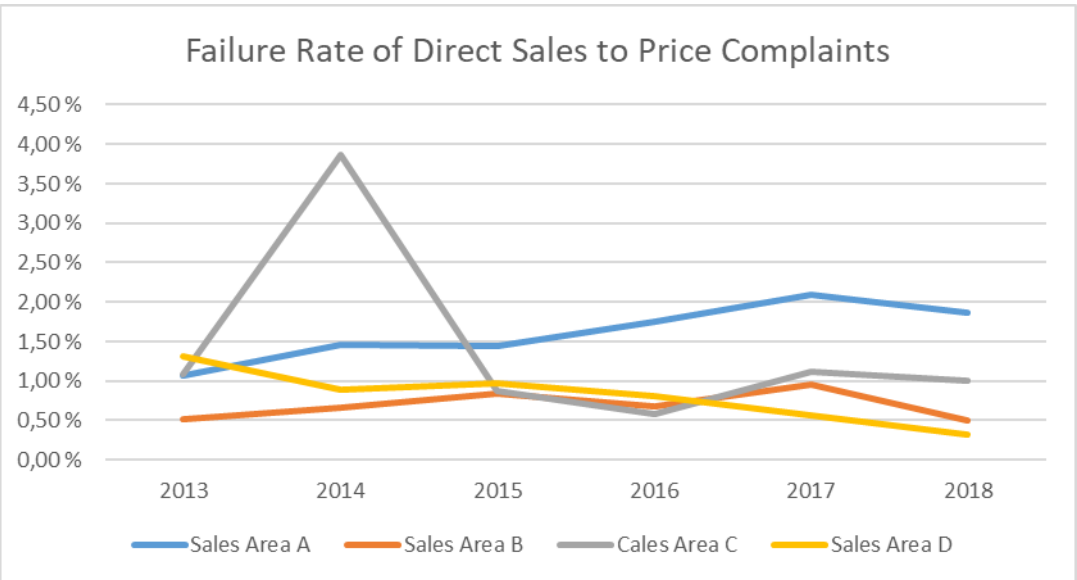

Figure 14. Failure Rate of Direct Sales to Price Complaints

Returns for orders in figure 15 also has some peaks and is not entirely collected, as in figure 14. Sales area C is the only organization with a peak in both price complaints and returns though not in the same year.

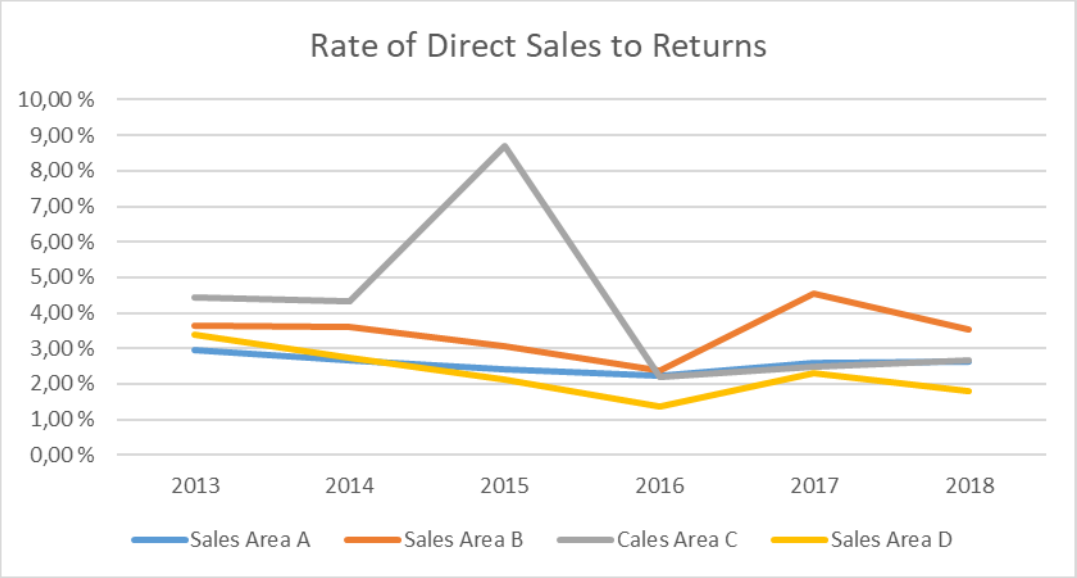

Figure 15. Rate of Direct Sales to Returns

The rate of miscellaneous complaints is rather negligible (Figure 16), in this context it may entail sales action towards a minor issue, mostly in terms of goodwill. Notwithstanding the need for uncategorized recourses to mend various mistakes that invariably happen, such should be unnecessary. Considering the volume of Direct Sales, a rate of up to 0,7% for sales area A in this category may be viewed as rather high. The sales area A also has comparatively high amount of price complaints, indicating there has been a difference in how activities were managed other sales areas.

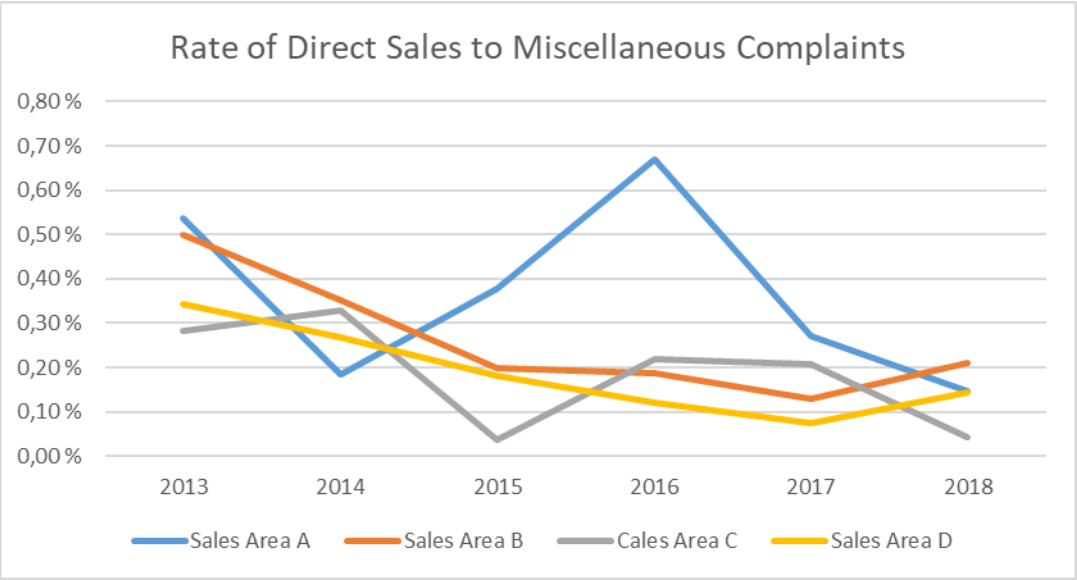

Figure 16. Rate of Direct Sales to Miscellaneous Complaints

In the broad sense complaint rates for Direct Sales, when taken toghether do not vary significantly. When taken into context the overall workload, i.e. all Direct Sales (figure 7) to all Complaints and Returns, it can be discerned that given the difference in transactions volume, the complaint rates should be more dispersed if it were directly tied to sales volume. I.e. theres is not a varying context but rather a fixed context to compaint rates. So a variable amount of transactions will always lead to fairly fixed rate of errors, this would indicate structural issues not tied extensively to e.g. workload. This is exhibited by the fact that despite Sales Area C having the lowest volume of orders, while Sales Area A has the highest by orders of magnitude (figure 7), the total error rates in figure 17 are fairly close, the last two years.

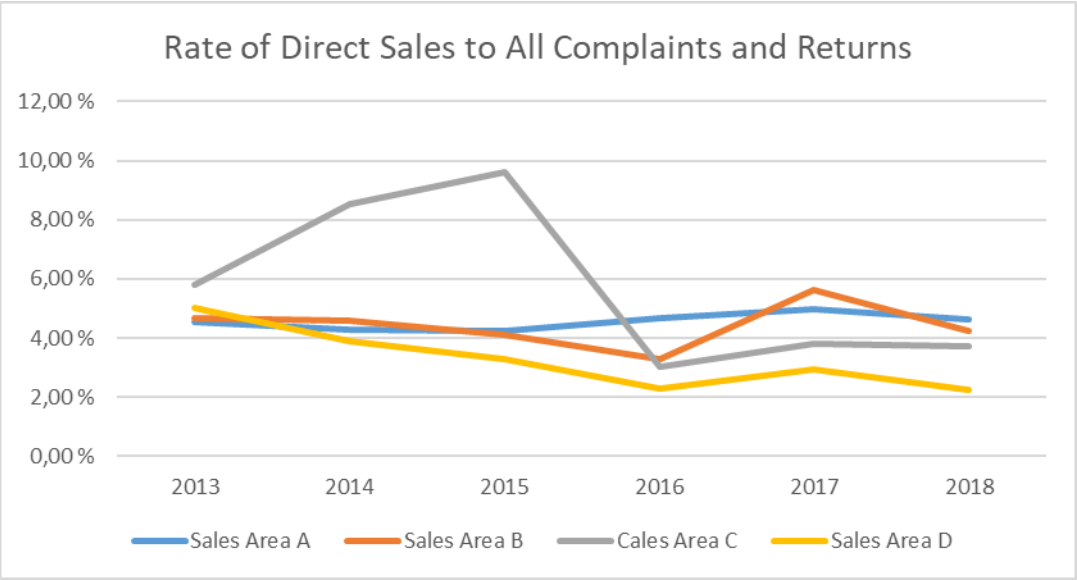

Figure 17. Rate of Direct Sales to All Compaints and Returns

4.3 Variance between customer groups

Based on the data set it was not possible to study variance between different customer groups for subscription sales and service sales. While for indirect sales, it would not have given significant information due to the limited quantity of partners and transactions. Thus, for Direct Sales the variance was studied using the coefficient of variation. It shows the dispersion around the mean. The higher the coefficient of variation the greater the dispersion (Brown, 1998).

From a sales area perspective (table 6) there was a dispersal, for price complaints being pointed and thus interesting. Indicating each sales area has various means or challenges in achieving operational outcomes, in this respect meaning correct invoicing. For Returns and electronic ordering, from the perspective of the sales areas there is a significant spread in all sales areas with some variation. The electronic orders spread is somewhat similar indicating the spread of ordering methods is somewhat similar within each sales area, of which B differs. According to Brown (1998) a value “exceeding say 30%” may be problematic and not necessarily provide meaningful information. Thus, there might have been cause, to analyze the data by different means to either replace or elucidate the results better.

Ratio to Customer Orders	Sales Area A	Sales Area B	Sales Area C	Sales Area D
Price Complaints	311,75 %	111,58 %	189,18 %	210,29 %
Electronic Orders	37,85 %	124,44 %	41,32 %	31,02 %
Returns	247,15 %	142,06 %	209,20 %	90,43 %

Table 6. Coefficient of Variation to Sales Areas

Further the grouping was studied by categorizing the customers according to the corresponding volume of Customer orders. Those with over 1000 transactions in the data set categorized as High, those with 999 -500 as moderate, low with 100 to 499 and very low for under 100 transactions. With cases having low or especially very low transactions differences and variations become apparent. Price complaints are highest for the lesser buyers, it is however difficult to draw any conclusive conclusions about the variation from the data, as e.g. the High category has more than the moderate group. This might be due to special sales activities being targeted more to those with a High level of transactional activity. The rate of returns relatively speaking is of low variance, not tracking price complaints, thus indicating logistics is a little bit more efficient for high and moderate volume customers. The electronic orders measure the spread of manual to electronic order entry. For the very low category most of the orders being manually entered, thus the spread is low at 25,83%.

Ratio to Customer Orders	High	Moderate	Low	Very Low
Price Complaints	139,43 %	107,05 %	240,31 %	1057,67 %
Electronic Orders	143,37 %	107,89 %	72,75 %	25,83 %
Returns	78,65 %	75,39 %	174,85 %	97,23 %

Table 7. Coefficient of Variation to Customer Categories

4.4 Enterprise Applications

Of all the different sales processes, subscription and indirect sales have the highest rate of complaints to sales transactions. When looking at the application architecture some interesting points become apparent. With the core ERP and its inherent building blocks being the central application, most of the sales processes have specialized applications supporting the process, either customer facing or internally used by the supplier. The availability of these is presented in table 9. While subscription sales have no specialized application supporting the process, indirect sales are supported by a customer facing

application which is the same as used for direct sales, constituting established procedures in the customer interface. Indirect sales entails three parties with the buyer, supplier and sourcing partner. A specialized application layer is not available between supplier and sourcing partner.

One might argue the core ERP could be extended, however the existence of supporting specialized applications and a rather high rate of failure for the processes with no or only partially supporting specialized applications, indicates the core ERP is not easy to develop in itself to support enterprise integration. Thus, the capability to create, leverage and source and integrate supporting additional applications would conceivably be of significant value to ensure efficient processes.

Process	Supporting additional Applications in addition to core ERP	Customer facing/accessable	Supplier
Indirect sales	Supported by Specialist Application	Yes	No
Direct Sales	Supported by Specialist Application	Yes	No
Service Sales	Supported by Specialist Application	No	Yes
Subscription Sales	No specialist Application layer	No	No

Table 8. Supporting Applications

What a specialized application allows is structuring the communication or data, while allowing access and utilization of the information inherent to the process as deemed appropriate. Tying stakeholders and collaborative partners to a model where the system itself sets boundaries, as to appropriate action for different eventualities.

Of note is that the specialized application for service sales does not cross organizational boundaries, in the sense that it is only structuring data within and for internal use. It nonetheless has external influence in terms of a low rate of wrong process outcomes. In the direct sales process the specialized application is structuring communication between two different parties, without an internal dedicated specialized application for assisting correct pricing outcomes.

5. DISCUSSION

On a whole considering the multiple different processes one may draw some conclusions in the context of adaptability. Namely for a process to be managed with a low rate of errors, specialized applications are needed. On the other hand, if a core system is

adaptable it might also serve the purpose to some degree, but a case for this cannot be made from the research results.

The main emphasis of technical development should be in allowing the maximum utilization of the information dimension, while adhering to the organizational and business dimensions. Essentially this entails enabling effective accomplishment of functional tasks, using specialized applications and IT components. As without supporting IT systems conducting business is not efficient, and in some cases potentially not possible. Adaptability again is dependent on capabilities in the realm of enabling information technology utilization.

It may also be said from the results that enterprises, generally having multiple different sales processes, may not have the organizational capacity or resources to manage and improve concurrently all topics efficiently. As organizations may tend to focus on their main activities, minor processes may effectively be left out of the daily picture in the context of improvement areas.

5.1 Enterprise Integration and the Organization

When considering the results from a make-and-sell versus sense-and-response standpoint described by Korhonen and Halen (2017) relevant points arise. If there is a failure of consistently communicating and executing pricing conditions accurately, is it a failure of adhering to a make-and-sell strategy in the respect of adherence, acceptance and integration of repeatable standard job processes or is it rather, a failure to adapt to critical requirements, be it either internal or external. Divergence and variation within and between sales areas indicates it is not perceived necessarily as a common problem in terms of critical requirements, but rather behavioral or situational issues most probably figure in the outcomes. From a capabilities standpoint price communication and execution would be an elementary capability. If a party is not able to communicate or make use of such information efficiently and accurately their overall capabilities and business operations are lacking, in what should be expected.

Agility or rather ability to respond and adapt information systems and practices to an environment with different requirements, to or from several different communication sources for wholesale distributors, that interact with several suppliers, should be viewed as a basic capability. Suppliers are also required to offer industry standard solutions towards this end. On the notion of adaptability, none of the complaints data seemingly give any hint towards the issue of adaptive capabilities.

There are some indications to the topic of strategic capabilities, which is described as the ability to learn by Korhonen and Halen (2017). Though the total number of complaints have decreased, when looking at the area specific numbers it has not been consistent among all the sales areas. Again, indicating possibly different ways of doing things, and which are dependent on area specific factors in e.g. how information systems are used or not used by the relevant stakeholders.

5.1.1 EI in Collaborative Networks

Considering the indirect sales process where master data is essentially controlled by a third party, access links for exploration and exploitation of information becomes important. One may assume when one party is controlling while the other is maintaining data, the probability of deviations increase if the link is not fully structured and automatic, with an ability to sense or account for events in other systems. In the organizational dimension this would be linked to the question of ownership of a certain process, but without practical recourse to assure or monitor outcome. In a close collaborative network this should conceivably be viewed as an unnecessary pain point.

However, given the issues surrounding marshalling ES capabilities and resources to act upon such challenges in agile manner, the issue is representative of what problems such business models may face.

5.2 Adaptation in a Sales Organization

A sales organization by necessity or by virtue of its role in the enterprise, is to an extent tied to the make-and-sell model. When looking at a manufacturing enterprise, from the perspective of it being essentially a marketing organization, the sense-and-response

model becomes more crucial. This being because it must consider the entire value chain, i.e. develop, source and manufacture and sell and distribute its products. Thus, it must be able to understand, sense-and-respond to what its customers need in a broader context. The sales organization being in the middle, managing customer relationships must be able to understand the capabilities and competencies of the enterprise to be able to communicate effectively "how things are done", and must be aware of "how things are done" is changed, as described in the managing by wire concept by Nolan and Haeckel (1993). If a team is either not able or willing to participate in changing how things are done or responsiveness and understanding of requirements and reaching a consensus of the way forward is lacking, then there will be a disconnect in the IT-business alignment. Here the themes identified previously as obstacles identified to efficient EA implementation (Table 2) by Banaeianjahromi and Smolander (2016b) may be relevant, the research data does not give more insight into this topic

As to the issues involved in inefficient price communication, one would conceivably look at the information architecture framework, of the three categories the first being the structure, cognition and quality of the information. The second being the operation of communicating the information and third being the exploration, presentation and exploitation of the information. Though there is always room for improvement in any system it is unlikely these issues have been singularly at play several years in causing price complaints. Where specifically the problems may lie are difficult to tell from the results. But, considering the earlier supposition regarding the information framework, it is the business and organizational framework which may be more relevant. This is suggested from the results considering that smallest customers have the highest spread of complaints. With only incidental interaction, process outcomes without the learning component that frequency of an activity allows, may be more unpredictable. It could be argued that e.g. the cognition of the information might be difficult to understand in such a circumstance but might likely be an organizational issue, in defining processes to users and improving upon processes. Everything is linked and all parts enable or prevent any other part of being as effective as it can be. The strategy and customers in the business dimension and enterprise events, processes, employee behavior, 'structures and systems' and management in the organizational dimension are areas where variance, in the

successful execution of frequent sales events, may most likely lie in. As the information framework should be predictable in both its strengths and shortcomings.

5.3 Tools for Integration

There is a simple premise from a change management standpoint which could be summed up as "if you need everybody to stand, take away all the chairs". This entails designing the environment in which people and organizations operate, for example allowing only one method to accomplish something instead of having access to several recourses normally reserved for e.g. necessary process deviations or error management.
When to this end organizational measures fail, technical means of ensuring compliance can be the only means of ensuring process adherence.

Application development and continuous improvement and operation of it in this context becomes of supreme importance, as resources invariably are shifted and focused. Creative, strategic and adaptive capabilities and competencies become more important as things start moving at computer speed and the scope of influence of stakeholders of the operation and maintenance of IT systems increase. This should be viewed in the context of the management by wire model as described by Ing and Simmonds (2000). Whereas "emphasis on outcomes rather than means or processes" may be interpreted by different stakeholders in different ways, the guiding principle should be to consider outcomes, in that if a way of doing things, being preferable for some stakeholders are not resulting in correct outcomes, then those means to an end should be modified to where the outcome can be better assured.

5.3.1 From Human to System-to-System Communication

Considering EA and IT-business alignment more specifically with the stakeholder or collaborative dimension in mind, communication of technical properties, including especially the structure and cognition of the information (note Figure 5, from Hoogervorst (2004)), systems landscape and framework gain a bigger or at least equally important role as personal relationship management in a supplier-customer relationship. This entails the organizational dimension, which is a vital aspect to consider, as it is there that e.g. important events are defined. Especially in an environment with integration of digital

information into different data systems and increasing functionality, potentially with automatic decision-making capabilities introduced into digital process workflows. Such a concept could be described, when sufficiently mature, as an inter-sensing collaborative network.

In a loosely coupled collaborative network, there may be many different perspectives on enterprise systems, some may have the inhibiting view while some follow the facilitating view, as described by Trinh-Phuong et al. (2010). E.g. in ‘service design’ providing software, e.g. through a partner, to facilitate collaboration is a basic concept.
In the EA context this would entail providing actionable or diagnostic artefacts to collaboration partners. Thus, shaping the environment. An enterprise engaged in sales activities would conceivably be as good at selling collaboration models, as it is with the products it manufactures. Creating extensive EA models which include the totality of different aspects, especially in external, i.e. customer systems, is not viable. Thus, agile and adaptive EA modelling and communication tools as discussed by Gill (2015), to structure related issues, even ad-hoc situational representations can be useful.

The ES concept from Trinh-Phuong et al., (2010), further provides the description as to the different organizational and systems capabilities an enterprise needs to be able to efficiently drive integrated inter-sensing collaborative network initiatives, which are highly attractive opportunities for efficiency gains if there is a willingness and ability to implement. In this respect taking as an example a simple sales process with following steps (1) buyer is promised a price, (2) an order response with prices to be executed is sent to the buyer after ordering, (3) goods are delivered and invoiced. The need to separately issue credit notes for the purposes of invoice correction means promises made, were not executed successfully. Thus, a promise was not kept in a sense, even though its corrected afterwards to reflect the initial promise. An inter-sensing network would know beforehand what is coming and be able to initiate management or corrective actions of the problem, to potentially avoid an after-the-fact correction being necessary.

5.4 Agents and Behaviors

In an organization with poor IT-business alignment the concept of agent-based modelling can be relevant. An agent can be an independent autonomous system or human agent. When processes are designed to flow through human agents the variance of process outcomes will likely be higher than with fully automated and computerized processes, to what degree depends on many factors.

Subscription sales might be relevant to agent-based modelling in the sense that all agents operating around the core ERP are independent human agents, not supported by specialized applications. In practical terms this means any inbound transaction is processed by a human agent receiving if from another external human agent, the information being structured in some sense. In such cases designing a system mitigating the weak points in the chain of standard repeatable processes, where human agent interaction, in the as-is state, is necessitated for process completion, would be necessary. In such cases, capabilities for creating and implementing specialized applications become vital for process improvement. An argument might be that independent human agents allow for greater agility or adaptability. However, it is not conducive for error free process outcomes. The point should also be made that specialized applications, where warranted, also allow for more efficient enterprise integration, i.e. by using IT for the purpose.

Emergent behavior may also lead to systems being used in a manner they were not specifically designed or intended for. E.g. a function allowing manual override may become the primary method of accomplishing something, instead of the exception. Thus, the original business model and its supporting systems become partly obsolete or non-supporting to "the way things are done". In such a case the enterprise has not sensed and responded but has been shaped by its environment in a manner not supportive of efficient enterprise integration in a collaborative network. A compounding factor is that any error handling on the supplier side is mirrored on the buyer side, thus a simple mistake is compounded across a collaborative network, where it may be simple to manage on one end but more difficult in other areas where it has an effect. It may constitute a hidden cost for the party responsible or causing the mistake, when considering only its own efforts required for corrective actions. Thus, when considering EI initiatives, where one party

has considerable leverage, it might be of consideration to model or assess the effects or impacts an activity or system might have in other parts of a collaborative network.

5.5 From Good Intentions to Bad Practice

It can be well perceived as valid, in the context of the results, that with the premise of using existing architecture within its design parameters, with an agreed upon way of going about how to change the architecture and activities, it would conceivably lead to better operational success defined by less process complaints during the road to improvement. Whether this is true for all the processes to some extent is not certain. Extrapolating upon this, how existing systems are used rather than what systems are available can have a great impact on operational efficiency.

5.5.1 'This is how we've always done it'

One could make the argument that any recurring functional manual task be it operational or analytical entails missing IT components or artifacts in the enterprise architecture, either not devised or not used or implemented properly.

Patchwork for such missing components can be created using macros and various robotic process automation techniques. To do so, which often relies on the user interface to the core systems, requires though what can be connotated to what was described by Korhonen and Halen (2017) as functional, creative and strategic capabilities, which can ultimately result in a degree of adaptive capabilities. The benefit of front-end automation can allow shortening a time span for acting upon a business requirement. However, the aim should be to change the core and associated enterprise systems where the time horizon for change implementation can be weeks, months or years depending on the scope. In addition to the planning and technical implementation, also the potential adoption rate of an artefact would be at play. In some respects, though technical aspects should not be underestimated, it may well be the organizational aspect of adaptation to new working processes and expectations that is the greatest hindrance to agility or efficient adaptability. This is also a factor in recognizing new requirements and expectations from the environment, where the organization operates in, as cited in EA studies.

Patchwork solutions especially for enterprise integration challenges, i.e. those involving reciprocal communication across organizational boundaries, are more challenging than using them for simple individual tasks, as the factors which cannot be reliably controlled can be more numerous in processes, which are collaborative in nature and thus often highly formalized processes. It would hence be a necessity for any adaptive endeavor to be formalized and collaborative, which requires change management capabilities and tools, rather than simply the capability of creating a code automating or enhancing the performance of a task.

Tactical fixes for current pain points is epitomized with the idea of patchwork solutions. They may be a confabulation in the EA context, arising from a functional perspective, inherently connected to the idea of existing EA structures being done. Sentiment within teams potentially being to do different things “as they’ve always done”. An example might be automatic processing of information contained in forms converted to PDF. These can be difficult to use or automate effectively in an IT environment unless the structure, use and content is highly standardized and agreed upon with all stakeholders. Inherent is the expectation of automatic handling and need to understand potential resulting mistakes by stakeholders, which inevitably occur as well with wholly manual processing. With structured and predefined API's and specialized applications such issues can be greatly mitigated but are also associated with greater development cost and complexity, requiring more of the organization’s adaptive capabilities and capacity. This requires the sentiment of the way forward to change from a functional to a constructional perspective.

Collaboration between stakeholders tends to be the stumbling point for organizations trying to implement and develop their architecture. Internal political and bargaining power being in some cases a further hindrance. Thus, studying EA and EI topics using interviews and conceptual methods might conceivably not bring forth all relevant issues. Even though the theory gives an organization the tools it needs to be successful, it will not be accepted and understood by all parties. Modeling the flow of the transactions and their success rate, along with workload by human agents associated with the transactions may give a more honest picture and is something not requiring access to people.

This entails the issue that problems are hidden from the organization to some extent, and thus corrective actions are low on the list of priorities. Any improvement being viewed as a functional problem rather than a conceptual one. As an example, the purposefulness of specialized applications to enhance core systems. In other terms looking inwards for solutions rather than to the outside, in this respect meaning using existing or those in the past used methods, concepts and mind-maps rather than tools and concepts from the outside of the team or organizational boundary. Enterprise architecture teams might also be able to more efficiently support the organization by viewing themselves as a service organization, seeking out and offering solutions which may already be available as artifacts. Actively shaping the environment where possible, while, as stated by Hope et al. (2017), supporting how architecture is practiced.

5.6 Bargaining Power and Error Rates

What the rate of acceptable failure might be, is not answered by the research results but is a relevant topic, businesses using e.g. the phrase "We keep our promises 98% of the time" as a marketing slogan is not a common occurrence. Though failures invariably occur, mitigating them is perhaps more important in some industries than others, as in critical services like power or water services. Total failure is different from partial, a marketing campaign may only accomplish 70% of planned impact and still be viewed as successful. The difference being that some activities are inherently more based on creativity than “hard skills”, like engineering of bridges. An ascertained and continuous 2% failure rate in designing and building bridges might not be acceptable. Process development should be viewed as a hard skill in this context as it entails repeatable mostly standard and controllable process steps. Thus, why an organization would tolerate in the long run mistakes related to core processes is an interesting question.

Part of the answer is to be found quite probably in the power play and culture of the organization or the internal and external environment and their interplay. This assumption is based on e.g. the fact, that specialized applications have been created and implemented in the context of some process areas. Further there is no significant downward trend in all processes, though spikes in some cases might be viewed as an event or series of events from which lessons were learned. The spread of customer complaints also give indication

in that different sales areas and customers act differently, whether the issue is lack of behavioral controls or agreed upon working methods, if e.g. disregarding established procedures for an innate reason, is not ascertainable. The literature review gives indication these issues may well be contributing.

A supplier should have the bargaining power to force adherence to its processes, however undoubtedly, adherence also depends on the utility and quality of the relevant systems and processes. One might surmise though, the higher the amount of complaints over a period, the higher the bargaining power of the party which might be indicated as most directly responsible. This is not necessarily a fixed actor but rather a variable one in the context of a collaborative network, particularly in the downstream network if there are multiple actors, with varying degrees of real or perceived bargaining power. Bargaining power is factored into the business architecture, i.e. in how to explore, exploit and develop gainful activities as described by Hoogervorst (2004), and in this case, exhibits itself in tolerance by stakeholders for what can be viewed as EA deficiencies related to the other dimensions, resulting in transaction failures. Thus, illustrating the interrelatedness of the different EA dimensions.

6.CONCLUSIONS AND RECOMMENDATIONS

As to the first research question (RQ 1) what, if any, components are missing one must draw the conclusion that from an EA standpoint IT-Business alignment is not fully covered in all aspects, relevant for 3 out of 4 processes studied. One may say that due to the low failure rate of Service Sales, it is covered in this respect. The topic of specialized applications having been found to be a discerning factor for rate of complaints for different sales processes. For the second research question (RQ 2) variance was found between sales areas. The variation within the sales areas can viewed as high. For whether the organization has improved over time there was little evidence for and thus one may deem, it has not been able to adapt or enhance its processes effectively across the range of all its activities. It was left inconclusive whether the amount of complaints clustered around certain customers (RQ 3), the results indicate a high variance in the rate of complaints. Especially relative to a lower frequency of sales transactions and potentially

level of active sales activities, which may be targeted at different customer levels and groupings within the defined levels.

It is evident that the organization has not been able to effectively respond and adapt in all instances, in the context of challenges faced in carrying out what is basic capabilities of an enterprise. The degree to which it hampers its business endeavors is not known. It is suggested the bargaining power of the enterprise is in its favor in this respect.

When systems are designed and implemented the reason towards why some design factors are the way they are and what the future state or development initiatives are, should be communicated to stakeholders. During the lifecycle of a system it is also prudent to maintain an awareness of both all the basic functions, as well as the best practices and from the systems perspective state-of-the-art capabilities and functionality it allows. In addition to learning new things, enterprise knowledge is lost which is then in best cases re-learned. The degree to which this phenomenon affects the enterprise depends on how strongly the strategic imperative of learning is implemented and maintained. In collaborative networks this learning imperative is also a necessity, the better the collaboration partners understand each other and how to develop together, the better the results they achieve. In environments where the stakeholders are only interacting incidentally or infrequently, the learning together aspect is less important. In such cases designing the enterprises externally facing dialogs and influencing the external environment, to allow easy, efficient and error free interaction are key. From a practical standpoint this may take the form of creating API's, limiting interaction options and participating in industry trade organizations.

The capacity and resources to create and implement IT-based solutions to different business requirements is of key importance. Thus, an enterprise should look for and develop capabilities and deliverables, which may be used in a modular fashion to build up adaptive responses to different requirements. This also affords the enterprise a possibility stemming from investment theory, i.e. the concept of doing nothing or rather waiting for an answer, which is also known as the real option theory, having capabilities available with a known implementation cost, provides an opportunity, rather than obligation to be used when a need arises. In a practical sense, building up modular

artifacts which have a high likelihood of having use in different business areas. This would also entail a need to create and maintain an understanding or develop an ability to have a representation of the enterprise architecture relevant to different functional teams and purposes, which can be used to discuss integration issues with different stakeholders, with possibility to enrich it with further information where warranted. For this, creative abilities, in addition to hard analytical skills can be useful in employees. E.g. being artistic or creative in sketching a representation of something on a flip board, piece of paper or creating effective charts of an IT landscape, enables more efficient and persuasive communication of what may be abstract and multifaceted topics related to IT-Business alignment.

When communicating and seeking organizational acceptance of different processes and IT systems, the matter of how all stakeholders might contribute to the change and further development and utilization of said processes and systems is a key factor, for continued and long term success of IT system utilization and development. Especially how to increase utilization of existing available solutions may be impactful, for example most software users often may not be using all the possibilities afforded to them to the maximum, sometimes just because they have not been informed of different optimization opportunities, which given the complexity and multiple functionality allowed by software being potentially difficult to master. Especially when the number of different programs needed is extensive.

6.1 Further studies

Issues around the topic supporting applications around core ERP systems could be an area of further study with significance. Namely e.g. modifying existing core systems versus patching or enhancing an IT landscape with supporting and to some degree standalone, but nonetheless, connected applications. While modularizing capabilities and artifacts and the reuse of such items in other similar processes, with a consideration of the breadth and depth needed of such applications. Additionally, what capabilities would be needed and influencing factors, in terms of costs, skills and concepts.

Further studying an EA of an enterprise using its transaction data to model different aspects, might be a significant source of insight. Comparative or singular studies of failure rates of different processes and contributing factors, including their upstream and downstream effects in a collaborative network, may also give further insight for consideration in IT investment decisions and management related topics, in the context of collaborative networks.

LIST OF REFERENCES

Akanksha, C. (2018), "Table 1 : The Differences Between Positivism and Interpretivism", *ResearchGate*, available at: https://www.researchgate.net/figure/The-Differences-Between-Positivism-and-Interpretivism_tbl1_326742672 (accessed 12 May 2020).

Banaeianjahromi, N. and Smolander, K. (2016a), "What do we know about the role of enterprise architecture in enterprise integration? A systematic mapping study", *Journal of Enterprise Information Management*, Vol. 29 No. 1, pp. 140–164.

Banaeianjahromi, N. and Smolander, K. (2016b), "UNDERSTANDING OBSTACLES IN ENTERPRISE ARCHITECTURE DEVELOPMENT", p. 16.

van den Berg, M., Slot, R., van Steenbergen, M., Faasse, P. and van Vliet, H. (2019), "How enterprise architecture improves the quality of IT investment decisions", *Journal of Systems and Software*, Vol. 152, pp. 134–150.

Bondar, S., Hsu, J.C., Pfouga, A. and Stjepandić, J. (2017), "Agile digital transformation of System-of-Systems architecture models using Zachman framework", *Journal of Industrial Information Integration*, Vol. 7, pp. 33–43.

Borek, A., Parlikad, A.K., Webb, J. and Woodall, P. (2014), *Total Information Risk Management - Maximizing the Value of Data and Information Assets*.

Brand, S. and Burton, B. (2016), "Avoid the 13 Worst EA Practices and Navigate to EA Success", p. 21.

Brown, C.E. (1998), "Coefficient of Variation", in Brown, C.E. (Ed.), *Applied Multivariate Statistics in Geohydrology and Related Sciences*, Springer, Berlin, Heidelberg, pp. 155–157.

Chan, J.O. (2009), "Integrating Knowledge Management and Relationship Management in an Enterprise Environment", Vol. 9 No. 4, p. 17.

DeMott, D.L. (2014), "Human Reliability and the Cost of Doing Business", p. 17.

Flynn, D. and Hussain, Z. (2001), "Using Structuration Theory to Explain Information Systems Development and Use in a Public Health Organization", presented at the Global Co-Operation in the New Millennium The 9th European Conference on Information Systems, Bled, Slovenia, p. 12.

Foorthuis, R., van Steenbergen, M., Brinkkemper, S. and Bruls, W.A.G. (2016), "A theory building study of enterprise architecture practices and benefits", *Information Systems Frontiers*, Vol. 18 No. 3, pp. 541–564.

Gill, A.Q. (2015), “Agile enterprise architecture modelling: Evaluating the applicability and integration of six modelling standards”, *Information and Software Technology*, Vol. 67, pp. 196–206.

Gomes, R.S. (2016), “Resilience and enterprise architecture in SMEs”, *Journal of Information Systems and Technology Management*, Vol. 12 No. 3, available at:https://doi.org/10.4301/S1807-17752015000300002.

Gong, Y. and Janssen, M. (2019), “The value of and myths about enterprise architecture”, *International Journal of Information Management*, Vol. 46, pp. 1–9.

Guenther, M. (2013), “4 - Big Picture”, in Guenther, M. (Ed.), *Intersection*, Morgan Kaufmann, Boston, pp. 90–133

Hoogervorst, J. (2004), “Enterprise Architecture: Enabling Integration, Agility And Change.”, *International Journal of Cooperative Information Systems*, pp. 213–233.

Hope, T., Eng, C. and Sharma, R. (2017), “The Failure of Success Factors: Lessons from Success and Failure Cases of Enterprise Architecture Implementation”, available at:https://doi.org/10.1145/3084381.3084392.

Insee. (2016), “Definition - Coefficient of variation / CV / CV | Insee”, Institut National de La Statistique et Des Études Économiques, 13 October, available at: https://www.insee.fr/en/metadonnees/definition/c1366 (accessed 21 May 2020).

Ing, D. and Simmonds, I. (2000), “Managing by Wire, Revisited”, *IBM Advanced Business Institute White Paper*.

Johnson, P., Lagerström, R., Närman, P. and Simonsson, M. (2007), “Enterprise architecture analysis with extended influence diagrams”, *Information Systems Frontiers*, Vol. 9 No. 2–3, pp. 163–180.

Kitsios, F. and Kamariotou, M. (2018), “Business strategy modelling based on enterprise architecture: a state of the art review”, *Business Process Management Journal*, p. BPMJ-05-2017-0122.

Korhonen, J.J. and Halen, M. (2017), “Enterprise Architecture for Digital Transformation”, *2017 IEEE 19th Conference on Business Informatics (CBI)*, presented at the 2017 IEEE 19th Conference on Business Informatics (CBI), IEEE, Thessaloniki, Greece, pp. 349–358.

Kostakos, V., Rogstadius, J., Ferreira, D., Hosio, S. and Goncalves, J. (2017), “Human Sensors”, in Loreto, V., Haklay, M., Hotho, A., Servedio, V.D.P., Stumme, G.,

Theunis, J. and Tria, F. (Eds.), *Participatory Sensing, Opinions and Collective Awareness*, Springer International Publishing, Cham, pp. 69–92.

Kotusev, S. (2016), "Journal of Enterprise Architecture", Vol. 12 No. 1, p. 10.

Lapalme, J., Gerber, A., Van der Merwe, A., Zachman, J., Vries, M.D. and Hinkelmann, K. (2016), "Exploring the future of enterprise architecture: A Zachman perspective", *Computers in Industry*, Vol. 79, pp. 103–113.

Macal, C.M. and North, M.J. (2010), "Tutorial on agent-based modelling and simulation", *Journal of Simulation*, Vol. 4 No. 3, pp. 151–162.

Mezzanotte, D.M. and Dehlinger, J. (2012), "Enterprise Architecture and Organizational Transformation: The Human Side of Information Technology and the Theory of Structuration", p. 7.

Nikpay, F., Ahmad, R.B., Rouhani, B.D., Mahrin, M.N. and Shamshirband, S. (2017), "An effective Enterprise Architecture Implementation Methodology", *Information Systems and E-Business Management*, Vol. 15 No. 4, pp. 927–962.

Nolan, R.A. and Haeckel, S.H. (1993), "Manging By Wire", *Harvard Business Review*, Vol. 71, pp. 122–132.

Noran, O. (2016), "Advancing Research in Enterprise Architecture - An Information Systems Paradigms Approach":, *Proceedings of the 18th International Conference on Enterprise Information Systems*, presented at the 18th International Conference on Enterprise Information Systems, SCITEPRESS - Science and and Technology Publications, Rome, Italy, pp. 539–548.

Proper, H.A. (2014), "Enterprise Architecture: Informed Steering of Enterprises in Motion", in Hammoudi, S., Cordeiro, J., Maciaszek, L.A. and Filipe, J. (Eds.), *Enterprise Information Systems*, Vol. 190, Springer International Publishing, Cham, pp. 16–34.

Rurua, N., Eshuis, R. and Razavian, M. (2019), "Representing Variability in Enterprise Architecture: A Case Study", *Business & Information Systems Engineering*, Vol. 61 No. 2, pp. 215–227.

Shanks, G. and Bekmamedova, N. (2018), "Chapter 7 - Case study research in information systems", in Williamson, K. and Johanson, G. (Eds.), Research Methods (Second Edition), Chandos Publishing, pp. 193–208.

Trinh-Phuong, T., Molla, A. and Peszynski, K. (2010), "Enterprise Systems and Organisational Agility: Conceptualizing the Link", p. 11.

Turner, J.H. (2001), “Positivism: Sociological”, in Smelser, N.J. and Baltes, P.B. (Eds.), *International Encyclopedia of the Social & Behavioral Sciences*, Pergamon, Oxford, pp. 11827–11831.

Vargas, A., Boza, A., Patel, S., Patel, D., Cuenca, L. and Ortiz, A. (2016), “Inter-enterprise architecture as a tool to empower decision-making in hierarchical collaborative production planning”, *Data & Knowledge Engineering*, Vol. 105, pp. 5–22.

Vargas, A., Cuenca, L., Boza, A., Sacala, I. and Moisescu, M. (2016), “Towards the development of the framework for inter sensing enterprise architecture”, *Journal of Intelligent Manufacturing*, Vol. 27 No. 1, pp. 55–72.

Wang, D., Amin, M.T., Li, S., Abdelzaher, T., Kaplan, L., Gu, S., Pan, C., et al. (2014), “Using humans as sensors: An estimation-theoretic perspective”, *IPSN-14 Proceedings of the 13th International Symposium on Information Processing in Sensor Networks*, presented at the 2014 13th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), IEEE, Berlin, pp. 35–46.