

Defining information systems: an organizational structure approach

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Abstract

This masterthesis is focused on finding a fit between organizational structure and information system architecture. The Viable Systems Model is used to develop a generic template for the functional requirements of an information system. In order to have the structure of an organization as the starting point when desiging information systems. To cover the non-functional requirements usability engineering is used. This study was done in the customer service department in a health insurance organization in the Netherlands. It was studied whether or not the functional requirements developed from the Viable Systems model were found in an actual organization. Further more the study focused on if the functional and non-functional requirements were met.

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1. Introduction

1.1 Problem context

This research has been focused on finding a ‘fit’ between organizational structure and information systems. There are differences in the meaning of “fit”, between organization structure and information systems. Different structures means different requirements for information systems. The coverage fit of the system is defined as “the extent to which the enterprise system meets the requirements of the organization” (Strong & Volkoff, 2010). The requirements that flow from organizational structures are necessary in order to create a coverage fit between information systems and organizational structures.

“Organizational and enterprise models have been promoted as a response to the observation that many IS projects fail, not because of technical difficulties, but because of a misconception of the potential contribution of the IS to the greater organization.” (Kawalek & Wastell, 2002, p. 24). Information system design is mostly done by looking directly at the work processes or activities (Lieshout, 2002), however is it possible to create a starting point for requirements engineering on the basis of the organizational structure? This will create the possibility to develop a better fit between organization structure and information systems. The reason for this is that if an information scientist looks at de separate activities and their relation, then the structure of the organization will be missed. Problems that were solved through the design of the organization are recreated by the information system (Lieshout, 2002).

A problem is that most implementations of information systems fail (Gargeya & Brady, 2005). Standard information system packages, like ERP systems, are being implemented and adapted to the organization. The systems however have limitations and cannot be fully adapted to the organization. This leads to the adaptation of organizations to the information system in order to create the fit between the organization and the information systems. But this could cause the organization to lose its competitive advantage over competitors (Marnewick & Labuschagne, 2005). Every organization would become the same in structure if the organizations adapt to the information system.

1.2 Problem statement

The aim of this master thesis is to determine if functional requirements developed from organizational structure can be used as an aid to create a coverage fit (Strong & Volkoff, 2010) between the information systems and the organizational structure. However, the functional requirements of an information system are not enough. Systems can be functionally correct, but the usage of the system remains difficult (Lee & McCrickard, 2007). The non-functional requirements for information systems are related to the usability of a system in this master thesis. The information systems architecture can be described through the use of three abstraction levels (Segars & Grover, 1994): The conceptual level, the logical level and the physical level. The information system architecture is described on the conceptual level of abstraction in this master thesis.

The theoretical relevance for this study is to create a link between organization structure theory and information system theory, in order to let the structure of an organization be taken into account when designing information systems. A generic template for an information system is developed based on the Viable Systems Model as an attempt to create an integrated approach when designing information systems between requirements engineering and organizational structure theory.

To describe the structure of an organization configuration theory defined by Mintzberg (1980) and the Viable Systems Model defined by Beer (1979) are used. The Viable Systems Model focuses on the functions that an organization needs to remain viable and their relation to each other. It gives an understanding of the activities an organization does in order to remain viable. Mintzberg (1980) defined five basic configurations of organizations. Organizations are pulled into five different directions by the basic parts of an organization. However the conditions in which the organization exists will cause an organization to be drawn to one of the configurations. These different configurations will all have different requirements for the information system architecture. The configuration theory only looks at the structure of an organization. The combination of the Viable Systems Model and the Configuration theory will lead to a combination of structure and the functions needed to remain viable for an organization. This will give the functional requirements for the information system.

Usability engineering will be used to determine the non-functional requirements for the information system. The requirements that have been developed from usability engineering will be used to determine the usability of the information system. From theory the

following non-functional requirements have been defined: Learnability, efficiency, memorability, errors and user satisfaction (Holzinger, 2005; Lee & McCrickard, 2007). These non-functional requirements are the same for each part of the organization.

The organization studied in this master thesis is a health insurance organization in the Netherlands. The study is restricted to the customer service department of this organization due to accessibility constraints. Due to time constraints it was not possible to gain access to the other parts of the organization. For this reason only three functions of the Viable Systems Model are studied. The implementation of a new information system was ongoing during the study, which is why the project has also been studied to determine how the organization attempted to improve the usability of the information system.

The goal of this master thesis is to gain insight in how organizational structure influences the requirements for information systems architecture. The research question is then defined as: *How does the organizational structure influence the requirements for the information system architecture?* The sub questions that have been defined to help answer this question are the following:

1. How are the five functions implemented in the organization?

This is necessary to determine where the functions from the Viable Systems Model are located within the organization.

2. What are the activities of the five functions in the organization?

The activities of the five functions determine their information needs, information manipulation, and generation. This will help determine the requirements for the functions.

3. What is the information needed for each function, information manipulated, and information generated by each function?

This will help identify the needs of the functions in order to perform their activities.

4. What are the requirements for the information system to cover the usability and the needs of the functions?

This will define the requirements for the information system.

5. How was the usability of the systems for the primary function improved?

This will let us look at a project concerning the implementation of a new system within the case.

1.3 Structure

This master thesis consists of five chapters. In the first chapter an introduction has

been given, the problem has been stated and the research question has been defined. In chapter two the theories used will be discussed. In chapter three the methodology will be clarified and substantiated. In chapter four the results of the data collection will be stated. In chapter five a conclusion will be given and the limitations to this research will be discussed.

2. Theoretical Framework

In this chapter organizational structure literature and information system architecture literature is discussed. The configuration theory developed by Mintzberg (1980) is used to describe the concept of organizational structure. The organizational structure theory used in the study is the Viable Systems Model (Beer, 1979) as this model gives an indication of what the functions in an organization have to do in order to remain viable and their relation to each other. The five functions of the model are used as a basis to develop functional requirements for information systems. This leads to a generic template of an information system (Kawalek & Wastell, 2002). The study is limited to the primary activity function, the coordination function, and the control function.

The information system architecture literature used in this master thesis is requirements engineering and usability engineering. The requirements engineering literature is used for the functional requirements for the Viable Systems Model and the usability engineering is used for the non-functional requirements for the information system architecture.

2.1 Organizational structure

Organizational structure can be defined as the division of work in an organization (Achterbergh & Vriens, 2010). A typology for this division of work has been developed by Mintzberg (1980) in his configuration theory. Mintzberg (1980) suggests a typology of five basic configurations of organizations. These are: Simple Structure, Machine Bureaucracy, Professional Bureaucracy, Divisionalized Form, and Ahocracy. The organizational structure of these five configurations are described in terms of the relation between the elements of organizations. These elements are five basic parts, five basic mechanisms of coordination, the design parameters, and contingency factors.

The basic parts of the organization (Mintzberg, 1980) consist of five elements. The first element is the *operating core* which are the employees in the production part of the organization. The second element is the *strategic apex*. This is the top management part of the organization and their staff. The third element is the *middle line* which are the managers who are in a direct line of formal authority between the strategic apex and the operating core. The *technostructure* is the fourth element. "The technostructure consists of those analysts, out of

the formal 'line' structure, who apply analytic techniques to the design and maintenance of the structure and to the adaptation of the organization to its environment." (Mintzberg, 1980, p. 323). The final element is the *support staff*. These people give indirect support to the other parts of the organization.

The mechanisms of coordination (Mintzberg, 1980) consists of five basic mechanisms. The first and most common is *direct supervision* where specific orders are given from one person, usually a manager, to others. Another mechanism is the *standardization of work processes*. In this mechanism "The work is coordinated by the imposition of standards to guide the doing of the work itself." (Mintzberg, 1980, p. 324). The third mechanism is the *standardization of output* in which "The work is coordinated by the imposition of standard performance measures or specifications concerning the outputs of the work." (Mintzberg, 1980, p. 324). The fourth coordination mechanism is the *standardization of skills*. In this mechanism the coordination of work happens through the internalization of standard skills or knowledge in individuals. The last mechanism of coordination is *mutual adjustment*. With the use of this mechanism employees coordinate their own work through informal communication to each other.

The design parameters defined by Mintzberg (1980) are used for the division of labor, standardization, determining units, and the design of the decision system in an organization. Standardization can be created in work processes, skill and knowledge, and output. Units can be the departments in an organization. A decision system can be centralized or decentralized.

Mintzberg (1980) also defined contingency factors that influence these different parameters. *Age and size* have been seen to have an important effect on structure. Research suggests that the older and/or larger the organization the more formalized behavior (Inkson et al., 1970; Pugh, Hickson, Hinings, & Turner, 1968) Also *technical systems* seem to influence the design parameters. If a technical system in an organization is more regulating, then the work will be more formalized and the structure of the operating core will be more bureaucratic (Inkson et al., 1970; Pugh, Hickson, Hinings, & Turner, 1968). Also the more difficult the technical system, the more elaborate administrative structure. When the support staff becomes larger and more professional it leads to greater selective decentralization and, because of the decentralization, more use of liaison devices (Hickson, Pugh, & Pheysey, 1969). Of course the *environment* affects the design parameters. Organic structures have been found in dynamic environments (Harvey, 1968). In more complex environments decentralized structures have been found (Hage & Aiken, 1967). The last contingency factor is *power*

structures. Formalization and centralization tends to increase because of external control of organizations (Pugh, Hickson, Hinings, & Turner, 1969).

The relationship between these elements determine the structure of an organization. This structure has to consist of the five functions described in the Viable Systems Model for the organization to be a viable system.

2.1.1 The Viable Systems Model

In this part the Viable Systems Model created by Stafford Beer (1979) will be discussed. The three strategies for dealing with complexity will be explained first and then the five functions and relationships between them. In the study only the primary activity function, the coordination function, and the control function have been studied.

2.1.1.1 Three strategies

The Viable Systems Model was created by Stafford Beer (1979). To deal with the complexity of the environment of the organization Beer defined three strategies. These strategies are: defining goals, attenuation and amplification, and recursion (Achterbergh & Vriens, 2010).

The first strategy is defining goals. Through the definition of the goals of the organization it becomes clear which part of the environment is relevant to the organization. A source of disruption for the organization can come from changes in the environment. These parts and aspects of the environment that can disrupt the organization are part of the relevant environment of the organization. In this way the complexity is reduced since the environment is reduced to the relevant environment which is smaller.

The second strategy is attenuation and amplification. This strategy is for dealing with disruptions/disturbances for the organization. Attenuation is focused on lowering the possibility of disturbances. These disturbances can originate from within organization and from the relevant environment of the organization. Amplification is focused on increasing the possibility of regulation that is necessary to deal with the disturbances that remain after the use of attenuator.

The concept of attenuation and amplification comes from cybernetics (Achterbergh & Vriens, 2010). When designing organizations a designer tries to think of all possible disturbances. To deal with these disturbances a designer has two different options (Achterbergh & Vriens, 2010): Attenuation and amplification.

Attenuation is the attempt to decrease the variety of possible disturbances. These disturbances can come from the environment and within the organization (Achterbergh & Vriens, 2010). Disturbances within the organization should be removed or at least reduced as much as possible. Attenuation can be realized by reducing the number of relations in a network of tasks and reducing the variability of these relations (Vriens & Achterbergh, 2011). In this way the probability that structures become the source of the disturbances decreases.

Amplification is the attempt to increase the regulatory potential to a level that allows to cope with the remaining disturbances. This can also be done in relation to the environment and within the organization (Achterbergh & Vriens, 2010).

There are different possibilities to achieve attenuation or amplification. “Both attenuation and amplification can come about by (changing) a particular division of work; a particular way to manage human resources and a particular configuration of technological means.”(Achterbergh & Vriens, 2010, p. 64).

The third strategy is recursion. Recursive systems are larger systems that contain smaller systems. These smaller systems are self-regulatory and self-organizing. These smaller systems themselves can contain even smaller systems (Espejo & Gill, 1997). These smaller systems are autonomous and have their own relevant environment to which they can adapt. By dividing an organization into these smaller systems, it becomes easier to deal with the complexity of the environment. The smaller systems deal with a small part of the complexity of the relevant environment of the entire organization to reduce the complexity (Achterbergh & Vriens, 2010). There however is a danger, if the organization keeps dividing it could lose parts that contribute to the viability (the ability to survive in the environment) of the organization.

2.1.1.2 The five functions

In the Viable Systems Model there are five different functions. A system must have these five functions to be viable. These functions are: primary activity, coordination, control, intelligence, and policy. These different functions will now be discussed.

The *primary activity function* are all the primary function of an organization. The reason to exist for an organization are accomplished through these activities (Achterbergh & Vriens, 2010). The primary activities themselves are viable systems. “This means that each of the primary activities has its particular goals, relevant environment, attenuators and amplifiers, and management.” (Achterbergh & Vriens, 2010, p. 196).

The *coordination function* is created to connect the different primary activities to each other. The coordination function coordinates the interdependencies between the different primary activities. These primary activities share resources and markets and thus are interdependent.

The *control function* is created to guarantee that primary activities will not only pursue their own goals. The primary activities should contribute to the system as a whole. This function creates synergy and cohesion between the primary activities in order to contribute to the identity and strategy of the organization as a whole (Achterbergh & Vriens, 2010). The control function reviews innovation proposals received from the intelligence function and defines the goals for the organization as a whole and translates these into goals for the different primary activities. The innovation proposals are evaluated, by the control function, on the possibility of realization based on the potential for change of the primary activities. The goals are not only created but also regulated and monitored by the control functions. In this way the control function has an overview of the organization. This is done through the use of three different instruments: giving commands to the primary activities about the goals that have to be realized, audits to make sure that reports received from primary activities are correct, and control over the coordination effort of the second function.

The *intelligence function* is created to ensure the ability to adapt to changes. This is necessary for an organization to remain viable (Achterbergh & Vriens, 2010). This function scans the relevant environment for developments that can affect the organization. The intelligence function creates innovation proposals to adapt to these developments. This focus on the environment of the organization is on the relevant environment of the entire organization and not on the relevant environments of the primary activities. The relevant environment of the entire organization is bigger than the combined relevant environments of the primary activities. In this environment there is a distinction between two environments: the accepted environment and the problematic environment (Achterbergh & Vriens, 2010). The accepted environment consists of the developments in the relevant environment of the organization. These cannot be changed by the organization. The problematic environment is the environment partially created by the organization. This is the outside of the organization of which it is the responsibility of the organization. The intelligence function is only looking to the future of the organization. "It is concerned with planning the way ahead in the light of external environmental changes and internal organizational capabilities so that the organization can invent its own future (as opposed to being controlled by the environment)."

(Espejo & Gill, 1997)

The *policy function* is the last function of the Viable Systems Model. This function was created by Beer to facilitate the debate between the control function and the intelligence function. These functions both have different views on the organization. The control function looks inside the organization to the realization of goals and the identity of the organization. The intelligence function looks outside the organization to the development in the relevant environment. In the debate between these two functions, they should be equal. If one dominates the other, then impossible innovation plans could be introduced or the other way around the denial of innovation plans can lead to missed opportunities for innovation. These debates are also necessary for the two functions to stay connected. If this does not happen the organization will come to a halt (Achterbergh & Vriens, 2010).

In order to overcome these problems the policy function was created. This function coordinates the communication between the control function and the intelligence function. The results of the debates are used by the policy function to redefine the goals and identity of the organization. It adapts the organization to the developments in the relevant environment and the potential for change in the primary activities (Achterbergh & Vriens, 2010). The policy function clarifies the overall direction for the whole organization based on the discussion between the control function and the intelligence function (Espejo & Gill, 1997).

2.1.1.3 The relations between the functions

The relations between these five functions are necessary to create viability. To explain these relations they can be divided into two different groups (Achterbergh & Vriens, 2010). The first group has the focus on the realization of goals. This group consists of the first three functions: the primary activity function, the coordination function, and the control function. The second group has the focus on the adaptation of goals. This group consists of the last two functions, the policy function and the intelligence function, and the control function again. These groups are connected by the control function which looks at both the realization of goals and the adaptation of these goals (Achterbergh & Vriens, 2010).

In the realization groups there are four different relations. “The first relation is the direct commands and reports relation between control and the primary activities.” (Achterbergh & Vriens, 2010, p. 206). The goals of the organization are translated into the goals for the primary functions by the control function. The control function then monitors the performance of the primary on these goals.

The second relation is between the same functions as the first relation. This relation is focused on audits. This is a check to know if the performance reports received from management of the primary functions are correct and complete. A channel past the management is created for this. In this way it reduces the risk of fraud and the control function becoming estranged from the activities and problems that occur in the primary activities.

The relation between the control function and the coordination function is the third in the realization group. The control function sets the target for the coordination function. The coordination function determines the interdependence that occurs between the primary activities. For determining these interdependences the coordination function needs to be informed about the goals of the different primary activities.

The last relation in the realization group is between the coordination function and the primary activity function. The coordination function takes the complexity of interdependency away from the primary activity function.

The second group consists of three relations between the functions (Achterbergh & Vriens, 2010). In the first relation the control function, the intelligence function, and the policy function are involved. The results of the debate, between the intelligence function and the control function, forms the basis for the decisions of the policy function about the adaptation a realization of the missions and identity of the entire organization. These plans should not be created by the policy function itself for it is too complex for the policy function.

The next relation is about the debate between the intelligence function and the control function. It has to be balanced and has to have room for complexity. The complexity is needed, because discussions about the future of the organization are complex. It involves aspects of the relevant environment and aspect of the organization. "Both projection and integration need amplified communication between intelligence and control." (Achterbergh & Vriens, 2010, p. 211) The functions also have to be interconnected. The regulation for this debate is done by the policy function. The policy function makes sure that these requirements have been met.

The last relation in the adaptation of goals group is the facilitation of the debate by the policy function for the intelligence and control function. The debate has to meet certain criteria for it to lead to the best quality of plans. The policy function consolidates the main topics discussed in the debate and monitors the degree of interconnectedness between the

control and intelligence function. The room for complexity in the debate is also monitored by the policy function.

2.2 Information Systems

An information system can be described in terms of its architecture. The information system can be seen as consisting of three abstraction levels (Segars & Grover, 1994). These abstraction levels are used to define the information system in this study.

The first level is the *conceptual level*. This is the information system described as concept in terms of the external requirements. It deals with the formal description of concepts, the relationships between concepts, and the information requirements. This is all defined in the enterprise model (Calvanese, Giacomo, Lenzerini, Nardi, & Rosati, 1998). The enterprise model is “(..) a computational representation of the structure, activities, processes, information, resources, people, behavior, goals, and constraints of a business, government, or other enterprise.” (Fox & Gruninger, 1998, p. 109). The enterprise model is a major component in enterprise resource planning systems (Fox & Gruninger, 1998). This model states the design of the enterprise, its processes and entities, and how these interact with one and other (Sowa & Zachman, 1992).

The *logical level* is the specification of the procedures and functions that the information system has to have to meet the requirements. At this level a system model is created. This system model contains the data elements and functions in the information system that represents the processes and entities in the organization specified in the enterprise model (Sowa & Zachman, 1992).

The *physical level* is the realization of the information system in terms of the computers, networks and applications. At this level the technology model is created. This is the system model adapted to the constraints of materials, tools, and technology (Sowa & Zachman, 1992).

The complexity that exists in the gap between problems in practice and the software implementation is addressed by describing complex systems at different levels of abstractions, as discussed above, and from multiple perspectives as models (France & Rumpe, 2007). The model driven approach is a business-driven approach for the development of software (Elvesæter, Hahn, Berre, & Neple, 2006). This approach is concerned with the bridging of the gap between problems in practice and the software implementation. Model-driven architecture (MDA) is used to create a blueprint of the enterprise (Brown, 2004). As is done on the conceptual level. It uses an approach that is not tied to a particular platform. It creates

interoperability in the system through the use of the unified modeling language (UML). UML is a modeling language that provides a standard way to visualize the design of an information system.

A specified view of MDA is defined by the Object Management Group (OMG), “an industry consortium of more than 800 companies, organizations, and individuals.” (Brown, 2004, p. 318). They use different levels of models. The first model is the computation-independent model (CIM). This focuses on the conceptual level and shows the environment and the requirements of the system. The next model is the platform-independent model (PIM). This is on the logical level and shows the specification of the services and interface an information system has to provide to the organization. This is independent of a software technology platform. The next step is to create a platform-specific model (PSM), which defines the information system in terms of the chosen software platform. The last model defined is the implementation-specific model (ISM). The platform-specific model and the implementation-specific model are both on the physical level.

On the conceptual level the computation independent model is used to show the environment and the requirements of the information system. The requirements for the information system are determined through requirements engineering.

2.2.1 Requirements Engineering

Requirements engineering is the process of discovering the purpose for which the information system was intended (Nuseibeh & Easterbrook, 2000). Stakeholders and their needs are identified and documented in such a way that it is amenable for analysis, communication, and implementation. “Requirements engineering is the branch of software engineering concerned with the real-world goals for functions of and constraints on software systems. It is also concerned with the relationship of these factors to precise specifications of software behavior, and to their evolution over time and across software families.” (Zave, 1997, p. 315). Requirements engineering is concerned with anchoring the development of systems to a real world problem. It operates in the gap between the informal world of the needs of stakeholders, and the formal world of software development (Nuseibeh & Easterbrook, 2000).

Requirements engineering is used in the first part of the development process. It helps with the assessment of the feasibility of a project and the risks associated to the development project (Nuseibeh & Easterbrook, 2000). An estimation of the costs of the project can be

made through the developed requirements. Also schedules and the technical feasibility can be determined through the requirements.

2.2.1.1 Elicitation of Requirements

The elicitation of requirements is the first step in the requirement engineering process. The information obtained in this process has to be interpreted, analyzed, modelled, and validated in order to determine if a set of requirements is complete. The most important goal of the requirement elicitation is to identify the problem to be solved by the system. This creates boundaries for the system to be developed (Nuseibeh & Easterbrook, 2000). The stakeholders are also critical to determine. These stakeholders are the client, the developers and the users of the system. This is critical, because the user needs to be identified to determine the usability of the system. The goal of the system can be defined in this way.

Model driven techniques can be used to elicit requirements. A specific model is provided for the kind of information that needs to be gathered. This model is then used as drive for the elicitation of requirements. Modeling notation and partial models can be used as drivers for further information gathering. There are several modeling categories (Nuseibeh & Easterbrook, 2000). One of these categories is enterprise modelling. This category helps understanding the organizations structure, business rules, the goals, tasks and responsibilities of their stakeholders, and the data the organization needs, manipulates and generates. This is often used to define the purpose of the system. It describes the behavior of the organization and in this way the goals of the organization and the associated resources and tasks. This model is then used to elicit the requirements.

Information systems use and generate information. The information that is used and generated by these information systems has to be understood, manipulated, and managed. Data modelling helps with these problems. It determines the information that the system has to represent and how this holds up to the real world problem.

Modelling requirements is often done for the adjustment or improvement of an existing system or for a future system that is going to be developed. Modelling the functional and dynamic behavior of the stakeholders and systems of the organization is required. In behavioral modelling the first step is to model how the work is currently performed within the organization. How the activities are done. After that this is analyzed to determine the essential functionality. Based on these models a new model is created of how the system should function.

The domain modelling part is about developing domain descriptions. A model is created of the environment in which the system has to operate. This helps reasoning about the environment in which the system has to operate itself.

The non-functional requirements modelling part focuses on the properties of the system as a whole. This concerns usability of the system. For example, the learnability, efficiency, memorability, errors and user satisfaction of the system (Holzinger, 2005; Lee & McCrickard, 2007). These are difficult to express in a measurable way, which leads to difficulty in analyzing these. Usability engineering is discussed in section 2.2.2.

2.2.1.2 Levels of requirements

There are three levels of requirements: The business requirement level, the user requirements level, and the technical requirements level. These levels are the steps to follow in the process of requirement engineering.

The business requirements level define the reason for developing the information system. The objectives and goals of the organization are clarified and stated in terms of the vision for the information system (Gottesdiener, 2003; Westfall, 2005). This describes the needs of the business on the conceptual level. The user level requirements define the functionality of the information system from the perspective of the user (Westfall, 2005). This describes needs of the users to perform their tasks in order to achieve the goals and objectives of the organization on the logical level. The technical requirements level defines the functional and nonfunctional requirements that are needed by the users on the physical level.

2.2.2 Usability engineering

The goal of usability engineering is to develop interfaces that are efficient and effective in use (Lee & McCrickard, 2007; Sohaib & Khan, 2010). “An application that features good usability will allow the user to perform the expected tasks more efficiently” (Seffah & Metzker, 2004, p. 72). Systems can be functionally correct, but the usage of the system remains difficult (Lee & McCrickard, 2007). Usability engineering tries to solve this problem by focusing on the needs of the end users. “It deals with issues such as system learnability, efficiency, memorability, errors and user satisfaction” (Holzinger, 2005; Lee & McCrickard, 2007, p. 2). The system learnability consists of how fast it is possible for a user to learn the system to begin working with the system. The efficiency of the system concerns if it is possible for the user to attain a high level of productivity with the system. The

memorability concerns the possibility to return to the system after not using it for a period of time without having to relearn to work with the system. The errors concern if fewer mistakes and no problematic mistakes are made while using the system. User satisfaction concerns if the users find the system pleasant to use (Holzinger, 2005).

The usability engineering method that is most established is scenario-based design (Lee & McCrickard, 2007; Rafla, Robillard, & Desmarais, 2006). This scenario-based design works with narrative scenarios that describe the users performing a task based on design knowledge components. This contains the negative and positive aspects of the designed interface. The usage situation is described in the scenario, and how this is done with many of the specific interface features (Lee & McCrickard, 2007). The result is used as a basis of the interactive systems. This scenario is then discussed with the end user of the information system for evaluation. This scenario based method has four specific design phases (Lee & McCrickard, 2007): *requirements analysis*, *activity design*, *information design*, and *interaction design*.

In the phase *Requirement analysis* information is collected on the current practices in the organization. Scenarios and claims are developed in the *activity design* phase that describe the activities and tasks that should be possible with the new system based on the findings in the previous phase. The *information design* and *interaction design* phases consist of designers determining how the activities and tasks are supported by the information provided through the interface and the way it interacts with the users.

2.2.3 Requirements of Viable Systems Model

In this part of the chapter the functional requirements for the information system that follow from the Viable Systems Model will be defined and the importance of non-functional requirements in VSM is discussed. The functional requirements are so that the information system supports the functions in the Viable Systems Model. This leads to a generic template of an information system (Kawalek & Wastell, 2002). The information system will be defined on the conceptual level as defined by Segars and Grover (1994). Thus in terms of the external business requirements (Gottesdiener, 2003; Westfall, 2005).

2.2.3.1 Functional Requirements

The primary activities in the viable system are in itself viable systems that again consist of the five functions (Achterbergh & Vriens, 2010). This is because of the

concept of recursion. The primary activity function needs a system that allows the function to perform the reason to exist for the organization (Achterbergh & Vriens, 2010; Espejo & Gill, 1997).

The coordination function needs information about the needs of the primary activity functions in terms of resources. This information is needed to coordinate the resources required by the primary activities. The coordination function also needs information about the activities performed by the primary activity functions in order to coordinate activities performed by the primary activities in the shared markets (Achterbergh & Vriens, 2010; Hoverstadt, 2010, 2011). In this way the goal of the coordination function is achieved. Through this information it becomes possible for the coordination function to connect the primary activity functions and coordinate the interdependencies between the primary activity functions.

The control function needs systems that support the use of the three instruments that help in the creation, regulation and monitoring of the goals for the primary activities (Achterbergh & Vriens, 2010; Hoverstadt, 2010). The control function needs to send information so that the goals for the primary activities can be set. Also it need to receive information about the realization of these goals. The control function also needs to receive information from employees under management about the progress in order to obtain an accurate report of the realization of these goals (Bititci, Carrie, & McDevitt, 1997). In this way the problem of too general or flawed reports from management is solved. At last the control function should have access to information about the activities of the coordination function. In this way the coordination effort can be controlled.

Different information needs exist for the control function for the second task of the function. It needs to receive information about the information proposals from the intelligence function in order to facilitate debate between the two functions.

The intelligence function needs information from the relevant environment of the organization. The task of the intelligence function is to identify possible development in that are relevant for the organization (Achterbergh & Vriens, 2010). The intelligence function creates an innovation proposal to deal with these developments. These proposals will need to be send to the control function and be debated.

The policy function needs the information that results from the debates between the intelligence and control function and also information about the process of the debate. In this way the policy function can monitor the debate. It also enables the policy function to

intervene if necessary to let the debate meet certain criteria. The overall goal is then defined based on the result of the debate. This will then be communicated to the entire organization.

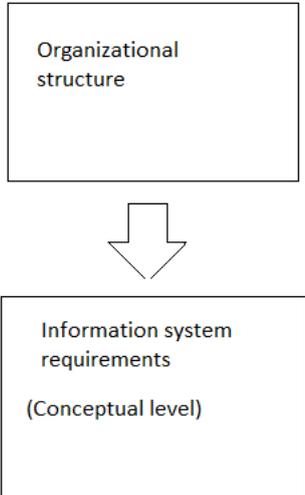
2.2.3.2 Non-functional requirements

As defined before the goal of usability engineering is to develop interfaces that are efficient and effective in use (Lee & McCrickard, 2007; Sohaib & Khan, 2010). Systems can be functionally correct, but de usage of the system remains difficult (Lee & McCrickard, 2007). So the goal is to make a system more usable and thus easy to use. The possibility of something going wrong is lowered by making a system easy to use.

Attenuation is the attempt to decrease the variety of possible disturbances. This is done by making a system more usable. It decreases the possibility of thing that can go wrong when using the system. This decreases the variety of possible disturbances.

2.3 Conceptual model

In this section the conceptual model derived from the theory discussed above is shown. The conceptual model that is derived from this theoretical framework is the following:



The organizational structure has been defined in terms of the Configuration Theory and the Viable Systems Model. This can be found in paragraph 2.1. The organizational structure has been divided into the five functions as defined in the Viable Systems Model. The five functions can be identified through the use of the configuration theory (2.1). The process from organizational structure to identifying the information system requirements is the following: The five functions from the Viable Systems Model perform certain activities that

lead to an information need, information manipulation and information generation (2.2.1.1). These information aspects define what the system should be able to do. This will lead to certain functional requirements for an information system for these five functions or an enterprise model on the conceptual level of abstraction (2.2). The usability of the information system is used for the non-functional requirements of the information system (2.2.2).

3. Methodology

In this chapter the methodology will be illustrated and substantiated. Also the conceptual model will be operationalized.

3.1 Approach

A qualitative research method will be used in this master thesis. This choice has been made, because knowledge is needed about how structure determines information system requirements. First the structure of the organization will be mapped to determine which structure is present within the organization. Then interviews will be held with people working in the organization to determine which requirements they need in order to perform their work in the organization. Their information needs, information manipulation, and information generation can be thoroughly identified, through the use of the interviews these can be mapped and related to the organizational structure. In this study the qualitative method was chosen, because this delivers rich research material as to how organizational structure influences the requirements of an information system. This gives a better insight into how the organizational structure and information systems are connected. Interviews can be used to start an extensive conversation in which a lot of knowledge about how someone experiences a situation can be obtained. Also the context of the problem could be made a central theme (Bleijenbergh, 2013). By using the interviews the needs of the employees can be extensively identified for the requirements.

In this master thesis a single case study has been chosen. To identify the requirements for the five functions profound knowledge of their information needs, information manipulation and information generation is needed. By using a single case study the organization can be studied in depth (Bleijenbergh, 2013) and in a natural setting (Benbasat, Goldstein, & Mead, 1987). This will help in gaining this profound knowledge of the nature and complexity of the processes taking place (Benbasat et al., 1987). Several data sources are used in a case study. This is called triangulation. Triangulation gives the possibility to study the phenomenon in depth and to compare different perceptions.

The case selection has been done on the basis of using an information system within the organization and size of the organization. The organization studied in this master thesis is a health insurance organization in the Netherlands. The study is restricted to the customer service department of this organization due to time and accessibility constraints. For this

reason only three functions of the Viable Systems Model are studied. The implementation of a new information system was ongoing during the study which is why the project has also been studied to determine how the organization attempted to improve the usability of the information system.

3.2 Data Sources

The data sources used in this study are the interview transcripts, documents, and observations that give a representation of the organizational structure. This has been done to identify the locations of the different functions of the Viable Systems Model in order to find the people that need to be interviewed. The people that need to be interviewed should have sufficient knowledge about the distribution of work within the organization. This means for example the department manager.

For identifying the requirements for the functions in the organization interviews with the people working in that function are used. Their information needs, manipulation and generation can be determined in this way. The job description is also used to determine the activities of these people in the functions. Observations of the organization is and the work processes are used to further determine the information need, manipulation and generation and the usability of the current systems. The people that perform the five functions should be interviewed for this.

Nine respondents have been used for the interviews. Two respondents from the primary activity function, two from the coordination function, four from the control function, and one for the project concerning the implementation of the new information system. Additional information was gathered through informal conversations with the three functions. Also observations in the form of own experience was used in the primary activity function.

3.3 Data collection

The data collection consisted of semi-structured interviews, observations, documents and informal conversations. The questions are set in a semi-structured interview, but the interviewer has the possibility to change the questions depending on the situation. By using a semi-structured interview a lot of specific knowledge can be obtained (Bleijenbergh, 2013). The interview questions can be found in the appendix. Also the respondents will received the same questions. This increases the reliability (Bleijenbergh, 2013). The documents used are job descriptions and an organogram of the organization. These have been received from the

contact person within the organization.

The observations allowed the activities to be observed first hand (Bleijenbergh, 2013). This gave information about the current usage of the information systems and problems associated with the information systems. In this way information with a high validity was obtained (Bleijenbergh, 2013). The informal conversations were conversations that did not disturb the social situation as is required (Bleijenbergh, 2013). As the role was one of the coworkers this did not stand out in the social situation. Of these observations and informal conversations memos were made to use in the analysis of the data.

The documents used are the job descriptions of the three functions. These stated the main task of the function in the organization.

Interviews have been done with employees that represent the different functions from the Viable Systems Model. First observations and informal conversation was used in order to identify where the functions are located within the organization. This will help answer the first sub questions: *1. How are the five functions implemented in the organization?* For sub question two informal conversation, observations and the interviews were used: *2. What are the activities of the five functions in the organization?* On the basis of interviews with the people working in the three functions the third sub question is answered: *3. What is the information needed for each function, information manipulated, and information generated by each function?* The fourth sub question can be answered through the answers on sub question 3. The fifth sub question can be answered through an interview with the project manager: *5. How was the usability of the systems for the primary function improved?*

3.4 Operationalization

The operationalization was used to develop the interview questions for the semi-structured interviews. This allowed to state the subjects that had to be discussed in the interview. After the data was collected the operationalization was used to analyze the data collected. It was used for the coding of the data collected.

The central themes have been operationalized into dimension and indicators based on theory. The dimensions defined from these central themes must contain every aspect of that theme. These dimensions have been further developed in order to define indicators that are closer to reality. This helped to connect these central themes to the empirical data found (Bleijenbergh, 2013).

During the interviews it became apparent that problems with the information systems used in the health insurance organization were related to the usability of the information systems. During the interviews additional questions were asked related to the problems with the usability of the information systems. Observations and informal conversations gave more insights into these problems. These problems were then related to the operationalization of usability engineering.

First the concept of organizational structure will be operationalized. This was done based on the Viable Systems Model (Achterbergh & Vriens, 2010; Espejo & Gill, 1997; Hoverstadt, 2010, 2011) and partly on the configuration theory (Mintzberg, 1980).

Core concept	Dimension	Dimension	Items
Organizational structure	Primary function	Operating core	Production of process or product
			Support of production of process or product
	Coordination function		Allocation of resources
			Connecting the primary activities
	Control function		Monitoring production
			Determine goals
			Perform audit
	Intelligence function		Monitor environment
			Innovation

	Policy function	Strategic apex	Determine overall direction of organization
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After the identification of the function in the case their information need, information manipulation, and information generation is studied. The dimensions were developed based on the Viable Systems Model (Achterbergh & Vriens, 2010; Espejo & Gill, 1997; Hoverstadt, 2010, 2011) and on requirements engineering theory (Nuseibeh & Easterbrook, 2000).

Core concept	Dimension	Dimension	Dimension	Items
Information system requirements	Business Requirements	Primary function	Information need	Availability of the information
				Usability of the information
				Accessibility of the information
			Information manipulation	Possibility to change information
				Possibility to delete information (Intentional)
				Possibility to delete information (unintentional)
		Information generation	Possibility to add information	
		coordination function	Information need	Availability of the information
				Usability of the information
				Accessibility of the information
			Information manipulation	Possibility to change information

				Possibility to delete information (Intentional)	
				Possibility to delete information (unintentional)	
			Information generation	Possibility to add information	
		Control function	Information need		Availability of the information
					Usability of the information
					Accessibility of the information
			Information manipulation		Possibility to change information
					Possibility to delete information (Intentional)
					Possibility to delete information (unintentional)
		Information generation		Possibility to add information	

The following operationalizations are dimensions of the core concept of information system requirements which have been added later in the study. The operationalization of the non-functional requirements based on the usability engineering theory (Holzinger, 2005; Lee & McCrickard, 2007; Seffah & Metzker, 2004; Sohaib & Khan, 2010) is the following:

Core concept	Dimension	Dimension	indicators
Information system requirements	Usability engineering	Learnability	Easy to learn
		Efficiency	Possibility to attain high level of efficiency

		Memorability	Possibility to start working again after long period
		Errors	Possibility of mistakes
		User satisfaction	Pleasant to use

The operationalization for the process of improving the non-functional requirements, the usability, is the following. This is created on the basis of theory (Lee & McCrickard, 2007; Rafla et al., 2006).

Core concept	Dimension	Dimension	Dimension	Items
Information system requirements	Usability engineering	Requirement analysis	Information about practices	Job of the user
		Activity design		Translation of the activities of the user
				Translation of the tasks of the user
		Information design		Information need of user
				Information manipulation of user
				Information generation of user
		Interaction design		Interaction of the system with the user

3.5 Data analysis

Deductive coding has been used when analyzing the transcripts of the interviews, the notes of the informal conversations, and the observations. This has been done through the

operationalization of the central themes based on prior literature review. The indicators were first used to relate the data collected to the literature. This automatically related to the respective dimensions as stated in the operationalization. An example of the coding process for the primary activity function can be found in the appendix.

The data from the informal conversation and observations to determine the location of the function within the organization were analyzed first. This is in order to define the activities performed by the functions in the actual organization. In this way it becomes possible to ask more specifically for their information need, information manipulation and information generation.

During the study it became apparent that not only the functional requirements based on the Viable Systems Model were important for an information system. It turned out that the usability of the information systems is the problem in the case. For this reason the usability of the information systems was added to the study as mentioned before.

The organization was in the middle of the implementation of a new information system with the goal to improve the usability of a system for the primary activity function. The project was added to the study to gain insight into how the improvement of the usability was attempted in the organization.

3.6 Limitations and Research Ethics

Limitations

The limitations that can occur in this master thesis is that in the research organization it could be possible that different functions of the viable system model can be located in one function in the organization. This could result in difficulty in distinguishing the requirements for the different functions located in the one function in the organization.

Another limitation that may occur is that within the researched organization not all five functions can be found or not all activities found in theory are done in practice. This limits the result to the functions found and the activities found.

Research ethics

The participants were informed about the goals of the research project and their role. If the participants wishes to remain anonymous then the interviews can be done at a location of choice and all specific details of participants will be removed to make sure they cannot be identified. The transcripts will not be enclosed in the master theses sent to the organization to prevent traceability. Findings are discussed with clear room for speech of the participants.

4. Results & Analysis

In this chapter the sub questions are answered based on the results of the study.

The sub questions are:

- 1. How are the five functions implemented in the organization?*
- 2. What are the activities of the three functions in the organization?*
- 3. What is the information needed for each function, information manipulated, and information generated by each function?*
- 4. What are the requirements for the information system to cover the usability and the needs of the functions?*
- 5. How was the usability of the systems for the primary function improved?*

In the organization the implementation of a new information system in the primary function is ongoing. Extra focus has been put on the primary function for this reason.

4.1 Case

In this section a description of the case used in this study is given. The organization in this study is a health insurance company in the Netherlands. This study is limited to the customer service department due to time and accessibility constraints. This is part of a viable system through the concept of recursion (Achterbergh & Vriens, 2010). It deals with the complexity of the environment in the form of questions of customers for the organization. This department is responsible for the customer service by phone. The customer service department consists of three different functions:

- The customer support function
- The traffic function
- The team managers

Not all of the five functions are found in the customer service department of the organization. The intelligence function and the policy function are located elsewhere in the organization. The system, that is the customer service department, is only viable when it is connected to other levels of recursion in the organization in which the other two functions are located..

The customer support function answers the questions from customers and make small changes in the insurance policy of the customer. The job of the customer support function is, as described in the job description, to handle all the customer contacts in a qualitatively good

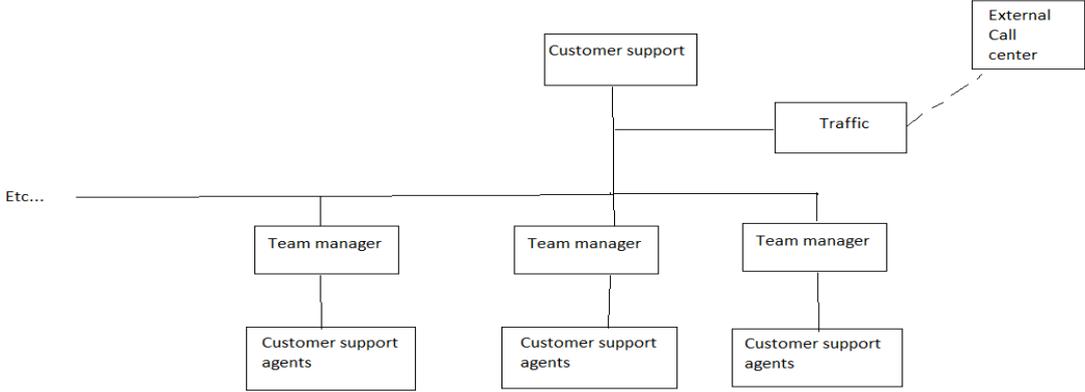
way, so that the customer is actually and completely helped (klantadviseur, 2011).

The traffic function is responsible for planning and coordinating the calls between the customer support agents. The job of the traffic function is, as described in the job description, monitoring and analyzing performance and schedules on location and team level, and supporting the Resource Planner with creating and updating schedules.

The team managers are responsible for the quality of the work of the customer support agents. The team manager function has been merged with the coach function in practice. The job of the team managers is, as described in the job description, The Team Manager Customer Contact is responsible for the proper handling of customer contact, care advice and complaints and disputes in accordance with the Share Life strategy (giving, listening, asking questions, valuing and sharing) (team manager, 2016). Another job performed by the team managers is, as described in the job description, coaching customer support agents daily in terms of content and communication skills so that they can conduct the ideal conversation and support them in further development (coach, 2016).

The customer service department uses an external call center for some of the incoming calls. The traffic function is responsible for giving the instructions to the external call center when there are too few customer support agents available. The external call center is an external company that receive instructions, from the traffic function, about the number of calls they have to answer. This is essentially a black box for the insurance company. The external call center acts as the customer support function, but the difference is that they receive instructions on the number of calls they have to answer and the insurance company does not care how many people they have to use for it, just so long as the number of calls they are instructed to answer are answered.

The department is structured as followed:



Within the organization there are different insurance labels. The labels are different “brands” within the company. To the outside world these labels are independent insurance companies and each has its own terms and conditions. These labels each have different phone number for the customer service. However, in reality the customer service department for each of the independent insurance company is the same. The customer support agent receives training for each insurance label. In this way the agents know the differences between the labels. The terms and conditions are different between the labels. For example, in the case of one label it is not possible to have additional insurance packages when living abroad, just the basic insurance package is available to customers living abroad. When the training has been completed, the customer support agent receives this skill. The customer support agents each have these skills which makes them available for different insurance labels. The job of the customer support agent remains the same for the different labels, which is the answering of questions and making small changes in the insurance policy of the customers. The customer support agents are allocated by the traffic function between these different labels

4.2 How are the five functions implemented in the organization?

The Viable Systems Model argues that a viable system always comprises five functions: the primary activity function, the coordination function, the control function, the intelligence function, and the policy function. The primary activity function, the coordination function, and the control function has the focus of the realization of goals (Achterbergh & Vriens, 2010). The intelligence function, part of the control function, and the policy function focus on the adaptation of goals. For this reason these last two function, the intelligence function and the policy function, are usually located at top management and staff in the organization. This is also the case in the health insurance organization where the study took place. The customer service department only focuses on the realization of goals, which is why only the primary activity function, the coordination function, and the control function have been found in this department.

Due to time and accessibility constraints, the choice was thus made to just use three different functions (primary activity function, coordination function, control function) since these have been found within the customer support department and the other two functions are outside of the customer service department (intelligence function, policy function). So these 3 functions are the focus of this study and have been identified as: The primary function, the

coordination function, and the control function.

The customer service department is part of a viable system within a viable system that is the entire insurance company. The primary activities in the viable system are in itself viable systems that again consist of the five functions (Achterbergh & Vriens, 2010). This is called recursion. Recursive systems are larger systems that contain smaller systems. These smaller systems are self-regulatory and self-organizing. These smaller systems themselves can contain even smaller systems (Espejo & Gill, 1997). In the following sections the identification of the functions within the customer service department as the primary function, coordination function, and the control function in the case are discussed.

4.2.1 The primary activity function

The reason to exist for an organization is accomplished through the activities performed by the primary activity function (Achterbergh & Vriens, 2010; Espejo & Gill, 1997). This is performed by the operating core of the organization. They produce or support the production of the product or service in the organization (Mintzberg, 1980). The reason to exist for the customer support department is answering the questions of the customers and making small changes in the insurance policy of the customer.

This job is performed by the agents in the customer support function. The customer support agents receive calls based on their skills. The customer support agents receive calls for different insurance labels within the company. For each label the customer support department has the same job, answering the customer question and making changes in the insurance policy.

“I answer customer questions over the phone.” (Customer support agent 2)

Because of the reasons above the customer support function has been identified as the primary activity function.

4.2.2 The coordination function

The coordination function is created to connect the different primary activities to each other. The coordination function coordinates the interdependencies between the different primary activities (Achterbergh & Vriens, 2010; Hoverstadt, 2010, 2011). These primary activities share resources and markets and thus are interdependent. The traffic function has two different activities. The first is the planning and distribution of the customer support

agents. The second is monitoring the incoming calls and make adjustments to keep waiting time as low as possible.

In the case the traffic function is responsible for the planning and distribution of the customer support agents. The customer support agents are the most important resource. The customer support agents are the resource that have to be allocated between de primary functions. Phones, desks, and computers are considered as given.

The traffic function monitors de incoming calls and make adjustments to keep the waiting time for customers of each label as low as possible. The Client system automatically distributes the calls based on the skills (the trainings for labels they completed) of the agents. The traffic function can make adjustments to change the distribution of the calls.

Because of the reasons above the traffic function has been identified as the coordination function.

4.2.3 The control function

The control function has three different instruments they use (Achterbergh & Vriens, 2010; Hoverstadt, 2011): giving commands to the primary activities about the goals that have to be realized, audits to make sure that reports received from primary activities are correct, and control over the coordination effort of the coordination function.

In the case the team managers inform the primary function about the goals that have to be met and the current status of the goals to make sure that everything is up to standard. The standard is set by the higher management.

The team managers maintain and check the quality of the calls made by the customer support agent. They audit the calls made by the employees. These are evaluated and discussed with the customer support agent.

The team managers however do not control the traffic function. This function reports to a higher level within the organization. The team managers are responsible for their own team. Because of the reasons above the team managers have been identified as the control function.

4.3 What are the activities of the three functions in the organization?

In this study the activities performed by the functions in the organization determine the requirements for an information system. To verify if this is true, the activities of the different functions should be found in the case. In this section the activities expected from

theory is discussed and then the findings in the case related to these activities is discussed. This is done to relate the activities found in theory to the case in question, to determine if the developed activities from theory are found in practice. The activities are discussed per function.

4.3.1 Primary activity function

The Viable Systems Model states that the primary activity function performs the reason to exist for a viable system (Achterbergh & Vriens, 2010; Espejo & Gill, 1997; Hoverstadt, 2010). The reason to exist for the customer service department is the answering of customer questions and making small changes in the insurance policy. This is the main activity performed by the customer support function. Observations of the customer support function concluded that the customer support function does this through the following activities: The customer support function does this by answering financial questions, answering healthcare cost questions and making small changes in personal information and in the insurance policy of the customer.

Financial questions

The customer calls with a financial question. The customer support agent then looks at the payment details to determine which bills have not been paid yet and determining which bills that yet have to come in. The customer support agent also has the possibility to make payment agreements with the customer. Payment agreements consist of making payment plans for customers. Payment plans are offered to customers, allowing them to pay in smaller installments.

The system used for this activity is the customer information system (KBA, klantbeeld applicatie). This system contains the following information: The personal information of the customer, the packages in the insurance policy, the letters sent, healthcare cost bills that have been received for the customer, notes about previous conversations with customer support agents, and bills that have been sent to the customer and whether or not these have been paid for by the customer. The agreements of payment plans are made in this system.

Healthcare costs

The customer calls to ask which healthcare costs are reimbursed. The customer support agent then checks the terms and condition of the insurance policy of the customer to determine if the healthcare costs, asked about by the customer, will be reimbursed.

The dialog support system contains information regarding the terms and conditions of the insurance policy, and information about the reimbursement of healthcare costs. The dialog support system is also used to make notes about the call the customer support agent made with the customer. These notes contain the question of the customer and everything that has been discussed during the conversation. These notes can then be found in the customer information system.

Changing information

The customer calls to make changes in their insurance policy. The customer support agent makes the changes, if he is authorized to make the change and checks the information. The changing of information consists of changing information in the insurance policy of the customer and personal information of the customer.

The insurance policy system is used to make changes in the insurance policy of the customer, such as changing the packages, or the method and frequency of payment.

Changes in the personal information of the customer is done in the customer information system. This consists of changing an e-mail address, phone numbers, and how the customer receives letters, in physical mail or digital. Physical mail goes through the postal office and digital mail comes on the digital account of the customer on the website of the insurance company.

This is a table for the activity performed and the system used:

	Answering questions		Changing information	
	Financial	Health care	Personal information	Insurance policy
Customer information system	C+M		M	
Dialog support system		C		
Insurance policy system				M

C: Consult the system

M: Manipulate information in the system

4.3.2 The coordination function

The coordination function is responsible for connecting the primary activity functions and allocates the resources between them. This function coordinates the interdependencies between the primary activity functions (Achterbergh & Vriens, 2010; Hoverstadt, 2010). The traffic function does this through the following activities:

Coordination during the day

The traffic function does this by making sure that there are enough customer support agents available, maintaining the occupation, for the day and making sure that the customer support agents with the right skills, the capacity, are in the right place. This is done in such a way that the service level is maintained. The stipulation of the service level is based on the requirement that the calls are answered within 20 seconds. The goal is to have at least 90% of the calls answered within 20 seconds. The traffic function allocates the customer support agents to make sure that the service level is as high as possible.

The system used for this activity is the Client system. In the Client system the traffic function receives information about the available customer support agents and their skills. So for which labels the customer support agents can receive calls. The traffic function receives real time information about the customer support agents. The status of the customer support agent, like available or in conversation or on break, are all seen in this system. The traffic function uses this information to allocate the customer support agents.

Planning and scheduling

The traffic function is responsible for the planning and schedules. This way the traffic function has the ability to allocate the resources between the different insurance labels and make sure that the capacity is available to handle all the calls coming in that day. As stated in the job description: “The traffic function ensures proper distribution of employees across the different workflows and channels.” (Traffic, 2011).

The Verint system is used for the planning and scheduling activity. In the Verint system the schedules for the customer support agents are found. The other part of the Verint system concerns the forecast. The forecast consists of the number of calls expected per day,

the service level (how much calls were answered within 20 seconds), and the AHT (handling time per conversation) used in the calculation. Also the results of previous days can be seen in the Verint system. All this information is used in the planning and scheduling activity.

Logbook

The traffic function creates a log. In this log every special circumstances during the day, such as malfunctions or when changes had been made in the welcoming text. This logbook contains every exception to the normal course of events. The traffic function uses this log to communicate the events of the day to colleagues. In this way a deviation from the forecast can be explained and can be taken into account in the future planning.

The logbook created by the traffic function is on an excel sheet.

A table of the systems used:

	Monitoring		Scheduling		Communication
	Service level	Allocate calls	Forecast	Schedule	To colleagues
Interaction client		M			
Verint	C		C	C+M	
Logbook system in excel					G

C: Consult the system.

M: Manipulate information in the system.

G: Generate information in the system

4.3.3 The control function

The control function is responsible for giving commands to the primary activities about the goals that have to be realized, audits to make sure that reports received from primary activities are correct, and control over the coordination effort of the second function (Achterbergh & Vriens, 2010; Hoverstadt, 2011).

In the case the control over the coordination efforts activity deviates from the theory. The control function does not control the coordination efforts from the traffic function. The traffic function is under control of a function higher up in the organization. The reason for this is because the coordination effort is a support function that coordinates calls for the entire customer service department and not per team. The team manager is responsible for his/her own team.

The second task for the control function is to evaluate innovation proposals from the intelligence function and to facilitate the debate between the primary activity function and the intelligence function. This task has not been found within the customer service department in the case. For this reason this task will be disregarded in the study.

The main activity for the team managers is to provide guidance to the customer support employees and evaluate their conversations. The control function does this through the following activities:

Goals

The team managers communicate the goals to the customer support function by providing the information about the standards to which the conversations are reviewed. The standards of a conversation are based on the following aspects, for example if the answer is right, if the customer support agent showed empathy, and if the conversation lasted 5 minutes or less. These are the goals the customer support agent has to meet.

The scores of the customer support agent in relation to the goals are noted in a system based on an excel sheet. In this excel sheet the customer support agent has the ability to find all the goals they have to meet. This excel sheet is accessible for all the customer support agents. This excel sheet is solely used for the communication of the goals.

Audits

The conversations of the employee is recorded and then evaluated by the team manager to determine if it is up to standard. A meeting is held with the customer support agent after the evaluation of the recording. In the evaluation meetings the customer support agent and the team manager discuss the evaluation of the recordings that have been evaluated. The things that can be improved by the customer support agent and the things he/she did well are discussed. "The team manager is responsible for the continuous process of quality improvement through objective monitoring of the customer contacts of customer advisers on both content and form." (Coach, 2016).

For the audits the Verint system, the dialog support system, and the customer

information system is used. The Verint system is used to listen and evaluate the recorded conversations of the customer support agent. The conversations are stored within this system, and evaluation forms are available in the Verint system. The team managers use these evaluation forms when evaluating the recorded conversation of the customer support agent.

The team managers note the average results of the evaluations, and the agreements made with the customer support agents in an excel sheet, next to the evaluation form in Verint. This is a different excel sheet than the one used for the communication of the goals.

When evaluating the conversation of the customer support agent, the dialog support and customer information systems are used to retrace the steps made by the customer support agents to check if the customer support agent used the system correctly and if the right answer to the question had been given. The team managers use the dialog support and customer information systems for the same information as the customer support agent.

A table for the use of the systems by the team managers:

	Answering questions		Evaluation		
	Financial	Health care	Recording of conversation	Evaluation form	Average score of evaluation
Customer information system	C				
Dialog support system		C			
Verint			C	M	
Overall score system within excel					M

C: Consult the system.

M: Manipulate information in the system.

G: Generate information in the system

4.4 What is the information needed for each function, information manipulated, and information generated by each function?

In requirements engineering the elicitation of the requirements is done through the use of models. Enterprise modeling helps understanding the organizations structure, business rules, the goals, tasks and responsibilities of their stakeholders, and the data the organization needs, manipulates and generates (Nuseibeh & Easterbrook, 2000). This is done to define the purpose of the system. This model is then used to elicit the requirements for the system. This section discusses the information need, manipulation, and generation per function to determine if the functional demands and wishes are met per function, in order to eventually elicit the functional requirements on the conceptual level.

Next to the functional requirements there are non-functional requirements (Glinz, 2007). These are difficult to define, but in this study the focus has been put on usability as non-functional requirement. The goal of usability engineering is to create interfaces that are efficient and effective in use (Lee & McCrickard, 2007; Sohaib & Khan, 2010). “It deals with issues such as system learnability, efficiency, memorability, errors and user satisfaction” (Holzinger, 2005; Lee & McCrickard, 2007, p. 2). This section discusses the non-functional demands and wishes are met per function, in order to eventually elicit the non-functional requirements.

4.4.1 The primary activity function

In the first section first the information need, then the information manipulation, and then the information generation is discussed, for the primary activity function, to determine if the functional demands and wishes are met. In the second section the usability of the systems, used by the primary activity function, is discussed to determine if the non-functional demands and wishes are met.

4.4.1.1 Information need, manipulation, and generation.

Information need

The information need for the primary activity function, in this case the customer support function, is the customer information and the terms and conditions associated with the insurance policy. The customer support agent needs this information, because this information allows the customer support agent to answer all the questions the customer might have. The information the customer support agent needs is:

- Which healthcare costs are reimbursed with the current insurance policy of the customer.
- The financial information of the customer.

In the dialog support system the information for the reimbursement of the healthcare costs for the insurance policy of the customer can be found. In the customer information system the financial information can be found. All the information needed by the customer support agent can be found.

Information manipulation

The information manipulation that is done by the customer support agents is the basic information such as email of phone numbers, changing insurance packages, and method and frequency of payments.

Changing the basic information can all be done in the customer information system. The changing of the insurance packages and method or frequency of payment can be done in the insurance policy system.

The customer can also communicate other information to the customer support that has to be changed. This information has to be manipulated by the back office outside of the customer service department. The customer support agent is not authorized to change this information.

“Well there are cases where it is not possible to do change information yourself but that is, for example, changed by policy administration, we then send the request for the change by mail.” (Customer support agent 1)

The customer service agent sends a request to the respective back offices and they manipulate the information. This request can be sent through the new dialog support system.

Information generation

The information generation that is done by the customer support agents is the notes concerning the conversations the agents had with the customer. For each call made by the agent notes have to be made about the conversation, about what the question of the customer was and what the answer given was. The customer support agent has the ability to write down

everything that has been said in the conversation. This is necessary, because in later conversations the customer service department or the customer can fall back on what has been said in the previous conversation. In this way if the customer claims that the customer support agent had said that for example healthcare costs would be reimbursed, then the customer support department can check if this is indeed the case.

These notes can be made in both of the systems used, the dialog support system and the customer information system. The normal way is through the Dialog support system. The notes are related to the customer question in the dialog support system. In this way there is a uniform way of categorizing the subjects of the conversations. Making notes through the customer information is just in case of emergency, for example when the Dialog support system is down.

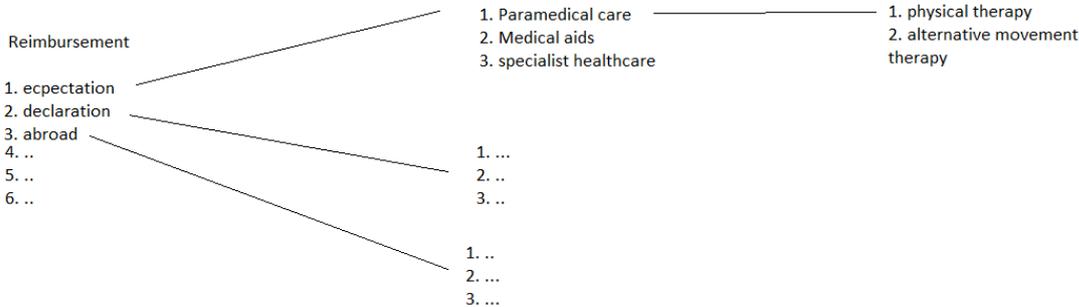
Conclusion

The customer support function has all the information needed available and the manipulation and generation of information is possible with the current systems. The current systems fulfill the functional demands and wishes.

4.4.1.2 Usability

From the systems used, by the primary activity function, only the dialog support system had problems with the usability in the past. The dialog support system has recently been renewed to improve the system. The type of information found within the system is the same as in the previous version. The change of the system was to improve the usability of the system. The dialog support system has been upgraded.

In the previous system, for answering questions, there were routes that had to be taken in order to find the information the customer asked for. This was complicated. The customer support agent had to choose within a list of options, which then led to a page with another list of options, which led to a page with another list of options (Observation nr. 4). For example:



It took a lot of time to go through all these pages and when a second question was asked, the

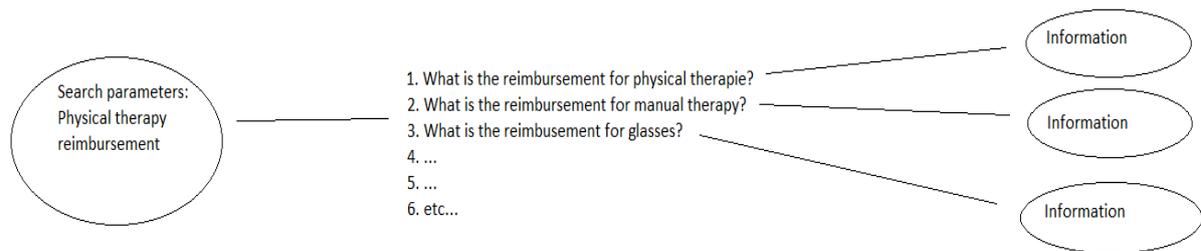
customer support agent had to start all over again from the first list. It also happened that a customer needed to know something about the first question, this resulted in going through all the steps once more to retrieve the information from the first question. This system was difficult for the employee as he/she had to know all the routes to find the information needed.

“There are no problems if you know where to go. The only problems there are is that you do not know where you have to be to find the information” (customer support agent 1)

There was another problem with this system. The information showed was not customer specific. The information was general and the employee had to link the information with the insurance policy of the customer. For example: The route has been taken to the information for physical therapy, then the reimbursement for physical therapy is shown. However the reimbursement depends on the package the customer has in his/her insurance policy. In one insurance package 9 treatments may be reimbursed, but in a different package 18 could be reimbursed. This forced the customer support agent to switch between systems, since the packages in the insurance policy of the customer could only be found in the customer information system. So the customer support agent had to look in the customer information system which packages the customer has and then look in the dialog support system what the reimbursement is. This led to mistakes. A common mistake was that the information for the wrong package was given to the customer.

Both of these problems, the routes and paths and the information that was not customer specific, had another disadvantage, because all these different steps that had to be taken led to longer conversations. Going through all the different routes each time the question changed and switching between systems took time. Longer conversations lead to higher costs, because if conversations take longer, then the customer support agent can handle less calls per hour, which means that more customer support agents need to be present to handle the same number of calls coming in.

This has been improved in the new dialog support system. The information shown is directly linked to the insurance policy of the customer, and thus the packages within the insurance policy. The information needed can be found by typing in the question of the customer or relevant words. The system uses smart queries to retrieve the information needed from different databanks. The result of this query is shown in a list in the form of questions related to the query. The customer support agent can then select the question that is needed and then the information related to the question of the customer is immediately shown. A model as example:



The information needed has already been made specific for to the packages in the insurance policy of the customer. The lists that the customer support agent had to go through are gone. All the steps and routes as in the old system have been removed. Also a possibility has been added to switch between questions. The information from previous questions can be retrieved when needed. Possible changes in information done by the customer support employee to better fit the question of the customer are also maintained. The new system is more usable as it is less difficult to find the information and the information shown is directly filtered to the insurance policy of the customer. The paths and routes that the customer support agent had to know have been removed. This also led to less time spent on the training of the customer support agent.

Conclusion

As discussed the improvements on the dialog support system have improves the usability of the system. The new dialog support system fulfills the non-functional demands and wishes.

4.4.2 The coordination function

In the first section first the information need, then the information manipulation, and then the information generation is discussed, for the coordination function, to determine if the functional demands and wishes are met. In the second section the usability of the systems, used by the coordination function, is discussed to determine if the non-functional demands and wishes are met.

4.4.2.1 Information need, manipulation, and generation

Information need

The information need for the coordination function, in this case the traffic function, is real-time information about the agents available for customer support of the different insurance labels.

The traffic function monitors the activities of the agents and allocates resources during the day to the places where it is needed. This is done based on the information received about the service levels for the different insurance labels. This is done in the client system.

The information about the available agents is restricted to the internal organization. The customer support department also has an external call center to which some calls are outsourced. Information about the agents of the external organization for the customer service is not available to the traffic function in real-time.

“So I'm not getting those calls from the external call center.” (Traffic 1)

This is not a problem as the external call center is seen as a black box. There is no wish to see this information

The schedules for customer support are made based on the expected number of calls, which is called the forecast, and the required service level, which means that 90% of the calls are answered within 20 seconds. This information can be found in the Verint system.

A part that misses in the Verint system is a log that registers changes in the schedule and by whom these changes were made.

“A kind of log that you can see what has happened to the schedule is missing.” (Traffic 2)

There is no way for traffic to check if changes were made or by whom. This is a problem, because sometimes customer support agents abuse this. The agent will then come to work late and say that his/her schedule first said that they had to start later or the agent will not come to work and say that the schedule said that he/she was free. The traffic function does not have the ability to check if this really was the case and the customer support agent gets away with it. It also sometimes happens that someone changed the entire schedule, but it is unclear why this has been done, also because the traffic function cannot see which specific changes have been made. The traffic function cannot ask the person who changed it, because they do not know who that is since there is no log.

Information manipulation

The information manipulation performed by the traffic function concerns the allocations of the customer support agents real-time, changes in schedules, the opening text for the calls, and the skills of the customer support agents.

An information manipulation performed by the traffic function is the allocation of the customer support agents, between the different insurance labels, to maintain service levels. As

stated above the customer support agents each have skills related to the different insurance labels. Changes can be made to the different agents to allocate certain calls from a label to an agent and prevent certain calls of a different label from going to that agent.

The traffic function changes the information in the schedules of the agents when needed. For example: The agent is late, this has to be changed in the schedule, or an agent has an unexpected meeting which has to be added to the schedule, or an agent is sick and not coming to work. All these things have to be changed in the schedule of the customer support agent.

“What you change is just the eh if you make a change in the schedule, you save it. So that is neatly processed in the schedule.” (Traffic 2)

The opening text the customer hears when making the call can be changed by the traffic function. For example the tape: At the moment we are very busy, so it takes longer than you’re used to from us, our apologies. These kind of tapes can be put in the opening text, with the client system, that the customer hears.

In the system the traffic function has certain rights. The interviewed workers mentioned that they have too much rights in the system. They also have the possibility to delete a customer support agent. This should not be possible for the traffic function. These rights should only be available for an administrator or the managers of the customer support agents. This is a problem with the authorization in the system and not directly related to the activities performed by the traffic function. This has no effect on the workings of the system or the work of the traffic function and a mistake is easily fixed. There currently are no plans to solve this problem.

The traffic function changes the skills for the customer support agents. Each time an agent completes a training and learns a new skill, the traffic function adds this to their information. When the skill has been added to the customer support agent, calls related to that skill will be directed to the customer support agent in question. This is all done in the client system.

“Because if an employee has had skill training, then I can add that.” (traffic 1)

Information Generation

The information generation performed by the traffic function is mainly the schedule. The traffic function creates the schedule based on the forecast. They make sure that there is enough capacity to reach the service levels for the different insurance labels. This is done in

the Verint system.

Another generation of information performed by the traffic function is the logbook with the events of the day in an excel sheet.

“A general log for centralized traffic, these are the day-to-day details of the daily course of events.” (Traffic 2)

Conclusion

The traffic function does not have all the information needed available. The log of changes in the schedule is missing. The information manipulation and generation is possible with the current systems. This means that not all functional demands and wishes are met.

4.4.2.1 Usability

The usability of the system used by the coordination function, in this case the traffic function, can still be improved.

One of the problems is, that all the configurations in the client system, for example the colors of notifications for deviations in the schedule and the status of the customer support agent, are personally implemented. Informal conversations lead to the conclusion that after every update of the system these configurations have to be implemented again by the traffic function. This usually takes about a day or two.

Another problem is that the arrangement of the system makes it difficult to use.

“But there is room for improvement indeed. Not necessarily in terms of functionality, but in terms of design.” (Traffic 1)

The traffic agents each have three different screens to show all the information needed at the same time, but these are still not enough. The agents all state that they would like another additional screen. They have to monitor a couple of different systems with these three screens. This is not possible with the three screens they have. This indicates that the current layout of the systems might not be optimal. Apparently the traffic function needs different information at the same time and needs another screen to be able to see all the information at the same time. A different layout of the systems, with more compressed information, could also solve this problem.

Conclusion

The non-functional demands and wishes, for the coordination function, have not been

met. The overall use of the systems has problems with showing all the information needed and the client system has to be configured each time after an update.

4.4.3 The control function

In the first section first the information need, then the information manipulation, and then the information generation is discussed, for the control function, to determine if the functional demands and wishes are met. In the second section the usability of the systems, used by the control function, is discussed to determine if the non-functional demands and wishes are met.

4.4.3.1 Information need, manipulation, and generation

Information need

The information need for the team managers is the recorded conversations between the customer and the customer support agent, the insurance policy information and the financial information from the customer, the terms and conditions for the insurance policy, and the standards the conversation should meet.

The team managers performs the same actions, during the evaluation, as the customer support agents and thus uses the customer information system and the dialog support system. The team manager does this to verify if the customer support agent gave the correct answer in the conversation. This is the reason that the team manager needs the recordings, the customer information system, and the dialog support system. The team manager uses these systems to compare the conversation to the standards.

Information Manipulation

The information manipulation done by the team managers consists of making changes in the schedule of the customer support agents, adaptation of the evaluation form, and the results of the evaluations.

The team managers make changes in the schedules of the customer support agents for evaluation meetings. These meetings have to be planned in the schedule of the customer support agent. This is done in the Verint program.

Another information manipulation is evaluation forms that need to be adapted after the evaluation. After the evaluation meeting held with the customer support agent, the team manager sometimes will want to make changes to the evaluation after the meeting. This can

be because of an explanation of the customer support agent on why they did what they did. This is all done in the Verint program.

“If you have done an evaluation then you can just adjust it again, so it is not when you save it then remains forever unchanged, you can always change the evaluation.” (Team manager 2)

The overall results of the evaluations are put in an excel sheet. This excel file is an overall performance list of all the customer support agents in the team of the team manager. The results of the evaluations of the customer support agents can also be deleted or changed, since this is an excel file accessible to all the team managers. The results of all evaluations and agreements made, with the customer support agent, are also stated in this file.

“That is not really a program but an excel sheet, in which we really keep an overview of all the results that have come out of it. So the results that come from the conversations we have noted in a separate excel sheet.” (Team manager 3)

Information generation

The information generation of the team managers consists of the evaluation of the calls of the customer support agents. They fill in the evaluation form for different conversations. After this evaluation a meeting takes place to discuss their evaluation. Agreements made with the customer support agent, on the basis of this meeting, will then be noted in a excel file. This can be, for example, things the customer support agent has to improve so that it is up to standard.

Conclusion

The control function has all the information needed available and the manipulation and generation of information is possible with the current systems. The current systems fulfill the functional wishes and demands.

4.4.3.2 Usability

The usability of the systems used by the control function, in this case the team managers, could be still improved.

One of the problems is that they need different systems to perform their tasks. They need the systems used by the customer support agent, a program in which they can listen to the conversations, access to the schedule program, and a different system in which the

agreements made can be noted down. This results in the use of different systems, each taking a lot of steps before coming to the right information.

“Yes, I do have everything I need, only sometimes I think it would be nicer to be able to work a bit more in one system. Now we have different systems that have to be used at the same time” (team manager 1)

Another problem is the system in the excel sheet. Currently the overall scores of the customer support agent have to be noted down in an excel file, while the actual evaluation is done in the Verint system. In the Verint system the only possibility is to do an evaluation per recording. An overall score or average score for a customer support agent is not possible. This also led to mistakes when taking the scores of the evaluation in the Verint program and noting them down in the excel file. Wrong numbers are sometimes noted down or the numbers are put with the wrong customer support agent.

A different problem with the use of the excel file is that sometimes team managers are working in the excel file at the same time. This is a problem, because when one of the team managers saves the file, then all the changes made by the other team manager is gone. This happens a lot and creates more work for the team managers and could lead to errors if the team manager does not notice this.

The old dialog support system had the same problems for the team managers as for the customer support agent. The new dialog support system is an improvement. The team managers use the dialog support system in making the evaluation, to check the steps the customer support agent made to find the information.

The problem with the Verint system is that it takes a lot of clicks to the right customer support agent and then to find the right conversation. This is actually a lot like the old dialog support system. Selecting an option from a list leads to a list, and the option from that list leads to another list.

Conclusion

The usability of the Verint system and the system in the excel file can still be improved. The problem is that the overall scores of the customer support agents have to be noted down in an excel file. An improvement would be that the overall score and agreements made can be noted in the Verint system with the evaluations and not separately in the excel sheet. The usability of the dialog support system has already been improved with the new system.

4.5 What are the requirements for the information system to cover the usability and needs of the functions?

In this study functional requirements have been developed from the Viable Systems Model theory on the conceptual level of abstraction (Segars & Grover, 1994). In this section these theoretically developed business requirements are discussed per function and related to the findings in practice. This is done based on the information need, manipulation and generation of the functions for the functional requirements.

The non-functional requirements are based on the usability and concerns the following aspects: system learnability, efficiency, memorability, errors and user satisfaction (Holzinger, 2005; Lee & McCrickard, 2007, p. 2). The non-functional requirements will only be discussed if there is a problem with the requirement. This is done because the non-functional requirements are the same for every function.

The functional and non-functional demands and wishes in the previous section are the basis for determining the functional and non-functional requirements.

4.5.1 Primary activity function

In the first section the functional requirements from theory are stated and then related to practice for the primary activity function. The next section the non-functional requirements from theory will be related to practice for the primary activity function.

4.5.1.1 Functional requirements

The functional requirement for the primary activity function is that the information systems allow the primary activity to perform the reason to exist for the organization. For the primary activity function the functional requirements are limited to only this requirement as the primary activity function in the viable system model are in itself viable systems (recursion) that again consist of the five functions (Achterbergh & Vriens, 2010).

The systems used by the primary activity function allows the function to perform the reason to exist for the organization. The information needed is accessible and the information manipulation and generation can be done with the current systems. The current systems fulfill the requirements.

4.5.1.2 Non-functional requirements

The non-functional requirements for the dialog support system used by the primary activity function were not met in the old system. The system learnability, efficiency, and errors could still be improved.

The old dialog support system had a problem with the learnability. This had to be improved. As stated before the customer support agent had to know all the paths and routes to the information in the system. This was complex and thus difficult to learn. In the new dialog support system this has been solved as stated above.

The old dialog support system was not efficient in its use. The customer support agent had to take all the steps needed to go through the paths and routes and could only see the information pertaining to one question at a time, which caused the agent to go through all the steps again and again. This was not efficient. In the new dialog support system this problem has been solved as stated above.

The old dialog support system led to errors of the customer support agents. The information shown was not customer specific. This caused the customer support agent to give the information for the wrong insurance package to the customer. This has been solved in the new dialog support system as stated above.

These problems with the non-functional requirements have been solved with the implementation of the new dialog support system.

4.5.2 Coordination function

In the first section the functional requirements from theory are stated and then related to practice for the coordination function. The next section the non-functional requirements from theory will be related to practice for the coordination function.

4.5.2.1 Functional requirements

The functional requirements developed for the coordination function:

- Information about the needs of the primary functions in terms of resources.
- The possibility to allocate the resources between the primary activity functions.
- Information about the activities performed by the primary functions in order to coordinate activities performed by the primary activities in the shared markets.

The findings in practice for these requirements are discussed.

Information about the needs of the primary functions in terms of resources

The traffic function receives the information for monitoring from the client system in terms of the service level for the different labels and the currently available customer support agents. Information about the available customer support agents in the external call center is not available and not needed.

The information about long term needs of the primary activity function is received from the Verint system. An estimation of the capacity needed is stated in the forecast in the Verint system.

The functional requirement is fulfilled with the current information systems.

The possibility to allocate the resources between de primary activity functions

The traffic function has the ability to allocate the resources available in the client system. The system allocates the calls coming to the customer support agents based on their skills and the traffic function has the ability to modify the allocation of the calls.

The long term allocation of resources is done through the Verint system in the form of the schedule for the customer support function. A part that misses in the Verint system is the log of changes made in the schedule.

This functional requirement is fulfilled with the current information systems, but a record of changes in the schedules is missing. However this does not affect the possibility to allocate the resources as this information is only necessary for when there are problems with the schedule.

Information about the activities performed by the primary activity functions in order to coordinate activities performed by the primary activities in the shared markets

Through the client system (CIC) the traffic function has the possibility to obtain information about the activities of the customer support agents for monitoring. Every status can be seen per customer support agent.

The traffic function can obtain information about the long term activities of the customer support agents in the schedule in the Verint system. The break-times and the time available for calls for the customer support agent are stated in the schedule.

This functional requirement is fulfilled with the current information systems.

4.5.2.2 Non-functional requirements

The non-functional requirements for the client system and the overall usage of the systems are not met. The efficiency and user satisfaction can be improved.

The efficiency requirement is not met in the client system. The client system is not efficient in use as with every update the personal configurations of the system has to be implemented again. This has consequences for the user satisfaction for the client system as the traffic function experiences this as a hindrance in their work.

The user satisfaction requirement of the overall usage of the system is not met. The information needed cannot be shown on the three screens that the traffic function has at the same time. The traffic function has to monitor the customer support function and has to work next to the monitoring. The layout of the systems does not make it possible to show the information that the traffic function needs to work and monitor the customer support function.

4.5.3 Control function

In the first section the functional requirements from theory are stated and then related to practice for the control function. The next section the non-functional requirements from theory will be related to practice for the control function.

4.5.3.1 Functional requirements

The functional requirements developed for the control function:

- The ability to communicate the goals for the primary activity function to the primary activity function.
- Information directly from the primary activity function on the realization of the goals.
- The ability to control the coordination efforts of the coordination function.
- Receive information about innovation proposals from the intelligence function.
- The ability to facilitate the debate between the primary activity function and the intelligence function.

The findings in practice for these requirements are now discussed except for the requirements related to the intelligence function and the coordination function, since these activities have not been found in the customer service department. For this reason only the following two requirements are discussed.

The ability to communicate the goals for the primary activity function to the primary activity function

The customer support agent can find his/her score related to the goals in a system based on an excel sheet. The team managers note the scores in this excel file.

The team managers inform the customer support agents about the goals through the

evaluations. The conversation held by the customer support agent is evaluated and a meeting is held to discuss the evaluation. During this meeting the goals are again communicated to the customer support function.

This functional requirement is fulfilled with the current information systems.

Information directly from the primary activity function on the realization of the goals

The team managers have the ability to monitor the realization of the goals through the evaluations of the conversations. This information comes directly from the primary activity function since the team manager listens to the conversation that has been held with the customer.

This functional requirement is fulfilled with the current information systems.

4.5.3.2 Non-functional requirements

The non-functional requirements for the overall usage of the systems, evaluation system in excel, and the Verint program are not met.

The non-functional requirements for the overall usage of the systems can be improved. The user satisfaction and error requirement for the overall usage of the system is not met. The team managers need to use too many different systems when evaluating the conversations of the customer support agents. The usage of these different systems also causes the team managers to make mistakes.

The efficiency and error requirements for the evaluation system based on an excel file are not met. The evaluation system based on an excel file is not efficient and prone to errors. If one of the team managers saves the file while the other is working in the file, it causes the other team manager to lose everything he/she had done in the file. This also causes errors when the other team manager does not notice that all his/her work has been lost.

The efficiency requirement for the Verint program is not met. The team managers have to go through a lot of steps before they come to the recording of the conversation. This is the same problem as with the lists leading to lists in the old dialog support system. This is the same in the Verint system for the recordings. The team managers has to go through the same kind of lists to find the recordings of the conversations.

4.6 How was the usability of the systems for the primary function improved?

This section was added to give an insight to how the insurance company improved the usability of the dialog support system to meet the non-functional requirements. The implementation of this new dialog support system is a form of attenuation within the organization. Attenuation is the attempt to decrease the variety of possible disturbances. These disturbances can come from the environment and from within the organization (Achterbergh & Vriens, 2010). Disturbances from within the organization should be removed or at least reduced as much as possible. Flaws in the organizational structure need to be attenuated. A way to attenuate possible disturbances within an information system is done by making a system more usable. It decreases the possibility of thing that can go wrong when using the system. This decreases the variety of possible disturbances. This has been done with the new dialog support system.

The new dialog support system was created to improve the usability of the system. The usability concerns the learnability, efficiency, memorability, errors and user satisfaction of the system (Holzinger, 2005; Lee & McCrickard, 2007). The most established method is usability engineering is scenario based design (Lee & McCrickard, 2007; Rafla et al., 2006). This scenario-based design works with scenarios that describe the users performing a task based on design knowledge components. This scenario based method has four specific design phases (Lee & McCrickard, 2007): *requirements analysis, activity design, information design, and interaction design*.

In this section the process of improving the usability of the dialog support system for the primary function will be stated and why it improved the usability.

Initiation

The reasons for starting the project initially was to separate the knowledge base system from the dialog support system. Then when problems arose with giving the right answers in the customer support function, the scope was adjusted. Making it possible for the customer support agents to give the correct answers became the main focus.

“That is what we actually got as goal, make sure that the system works well and that you can always give correct answers.” (Project manager)

The idea behind it as that the old dialog support had problems with the usability, which led to wrong answers by the customer support agents. Also the old system there were huge chunks of text, which caused the customer support agent to digress. This led to longer conversations as the customer support agent had to go through all the text and had the tendency to digress. This also led to more questions from the customer, which then also led to longer conversations. So the goal was to create a system that gave specific and compact answers.

Requirements analysis phase

In the requirement analysis phase of usability engineering, the collection of current practices in the organization, the job of the customer support agent has been identified as giving the correct answers to the questions of customers.

Activity design phase

In the activity design phase, describing the activities and tasks the should be possible with the system, the translation of the tasks was made by first listening to recordings of conversations of the customer support agents. In this way the project members got an indication of what the tasks and activities for the customer support agents were.

Several customer support agents were involved in the project in order to improve the translation of the tasks to the system and to improve the usability of the system. To further improve the usability of the system it also became possible for all the customer support agents to hand in feedback on specific parts.

Information design phase & interaction design phase

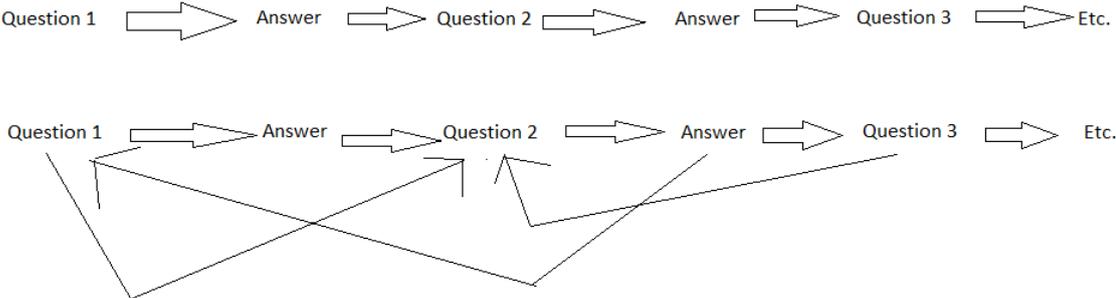
In the information design and interaction design phases the following steps were taken to determine which information supported the activities and tasks of the customer support agent and the way the system interacts with the users.

Attenuation was used to reduce the possibility of the disturbance of long conversations with customers. In the new dialog support system the customer inputs a customer question and then gets a list of related questions, selects the right one and obtains the information needed for the customer. The information provided to the customer support agent answers the question of the customer directly instead of the information being general. This attenuates the possible disturbance of long conversations with the customer, because the information that is found can be relayed directly to the customer. The customer support agent no longer has to go through huge chunks of texts to find the information the customer needs and is not inclined to give too much information.

The attenuation of the possible disturbance of giving the wrong information for the wrong package to the customer is solved by showing the information in the questions immediately related to the customer. The insurance policy of the customer is automatically integrated in the system and automatically changes the information to be customer specific. In the old dialog support system the information for all the insurance packages was shown. This led to mistakes, because the customer support agent read the information for a package that the customer did not have and gave that information to the customer.

The attenuation of the possible disturbance of giving wrong information in general to a customer has been improved. This is done with the possibility to have more than one question open at a time. Calls are never structured. The customer does not ask questions nice and orderly. Customers ask multiple questions at the same time or before an earlier question is answered.

For example the above model is a structured conversation and the model below is reality:



Questions come up throughout the conversation. This is why it is important to be able to switch between the different questions, so that it becomes possible for the customer support agent to give information about different topics without having to search for it each time the question changes. This made sure that the customer support agent could give the information while directly checking the information, instead of trying to remember the information the customer support agent had in front of him before and most likely giving wrong information.

Also in the new system related information that is most commonly also needed with the customer question, is made directly available for the customer support agent to improve the user satisfaction and efficiency. This additional information can be opened by the customer support agent when needed.

“In the new dialog support system it has been introduced that additional information for extra questions that may arise can be opened.” (Customer support agent 1)

Another improvement of the system was the learnability of the system. The customer support agent do no longer have to learn all the paths and routes.

Conclusion

The usability has been improved with the new system with new functions. The attenuation of possible disturbance has taken place with the implementation of this system.

5. Summary and conclusion

The goal of this master thesis is to gain insight in how organizational structure influences the requirements for information systems architecture. The research question used is:

How does the organizational structure influence the requirements for the information system architecture?

A study is performed at the customer service department of a health insurance company. This limitation to the customer service department was necessary due to time and accessibility constraints. This led to the limitation of the study to the primary activity function, the coordination function, and the control function, since these were the only functions found within the customer service department.

Requirements engineering has been used to determine the requirements for the information system. In requirements engineering theory a distinction is made between functional requirements and non-functional requirements (Glinz, 2007). This distinction has also been made in this master thesis. For the functional requirements the organization structure theory used is the Viable Systems Model (Achterbergh & Vriens, 2010).

The information need, manipulation and generation of the organization is used to determine the demands and wishes needed to determine the functional requirements of the information system (Nuseibeh & Easterbrook, 2000).

For the non-functional requirements the focus is put on usability of the information system. To determine the demands and wishes for non-functional requirements usability engineering is used (Lee & McCrickard, 2007).

Functional requirements are developed for the five functions of the Viable Systems Model, the primary activity function, coordination function, control function, intelligence function, and the policy function. Only the primary activity function, the coordination function, and the control function are used in the study due to accessibility constraints as the intelligence function and the policy function exist outside of the customer service department. Due to time constraints it was not possible to gain access to the other parts of the organization where the intelligence function and policy function were located.

The non-functional requirements focus on the attenuation of possible disturbances (Achterbergh & Vriens, 2010) by improving the usability of the information systems.

In the first section the findings regarding the functional requirements is discussed. In

the next section the findings regarding the non-functional requirements is discussed. In the third section the answer to the research question and the conclusion is given.

5.1 Functional requirements

The functional requirements are developed, on the conceptual level, from theory based on the activities and tasks of five functions of the Viable Systems Model. The verification of these functional requirements is done in practice.

The functional requirements that were developed from theory are discussed in this section. The section also discusses if these functional requirements are present in practice, and if these functional requirements are met.

Primary activity function

The functional requirement:

- The information system allows the primary activity to perform the reason to exist for the organization.

The functional requirement in practice was if the information systems, used by the customer support agent, allow the agent to answer the questions of customers. This is the reason to exist for the customer service department. The current systems, with the new dialog support system implemented, fulfill the requirement for the customer support function.

Coordination function

The functional requirements:

- Information about the needs of the primary functions in terms of resources.
- The possibility to allocate the resources between the primary activity functions.
- Information about the activities performed by the primary functions in order to coordinate activities performed by the primary activities in the shared markets.

The first requirement exists in practice as the coordination function needs to know the service levels and the forecast of the primary activity function to be able to coordinate the resources. The client system and the Verint system fulfill this requirement.

The second requirement exists in practice as the possibility to allocation of the customer support agent between the different labels. The client system fulfills this requirement in real-time and the Verint system fulfills this requirement in the long term.

The third requirement exists in practice as information about the activities performed

real-time and scheduled long term for the customer support agents. The client system fulfills the requirement in real-time and the Verint system fulfills this requirement for the long term.

Control function

- The ability to communicate the goals for the primary activity function to the primary activity function.
- Information directly from the primary activity function on the realization of the goals.
- The ability to control the coordination efforts of the coordination function.
- Receive information about innovation proposals from the intelligence function.
- The ability to facilitate the debate between the primary activity function and the intelligence function.

The first requirement exists in practice as the communication of the standards the conversation held by a customer support agent must meet. This requirement is fulfilled with the evaluation system on the excel sheet and the evaluation form in the Verint system.

The second requirement exists in practice as ability to evaluate the conversations held by the customer support agent. This requirement is fulfilled with the recordings in the Verint system.

The last three requirements relate to activities that are not performed by the control function in this case and thus have not been found in practice.

Conclusion

The functional requirements for the primary activity function, the coordination function, and the control function have been met. The current systems fulfill the requirements of the different functions.

5.2 Non-functional requirements

The non- functional requirements that were developed from theory are summarized in this section and discussed if these non-functional requirements were met. The non-functional requirements for the systems are based on usability engineering and have been defined from theory. The non-functional requirements are the same for each of the functions. The non-functional requirements are:

- Learnability
- Efficiency
- Memorability

- Errors
- User satisfaction

Primary activity function

Originally the non-functional requirements learnability, efficiency and errors were not met in the case for the customer support function. This was with the old dialog support system. The non-functional requirements have been met with the new dialog support system.

Coordination function

The non-functional requirements user satisfaction and efficiency are not met with the current systems. The overall usage of the system does not meet the user satisfaction requirement and the client system does not meet the efficiency requirement.

Control function

The non-functional requirements efficiency, errors, and user satisfaction are not met. The overall usage of the systems does not meet the user satisfaction requirements and the system in excel and the Verint system do not meet the efficiency requirement.

Conclusion

The non-functional requirements for the primary activity function are met with the implementation of the new dialog support system. The non-functional requirements user satisfaction and efficiency have not been met for the coordination function. The non-functional requirements user satisfaction, errors and efficiency have not been met for the control function. The systems for the coordination and control function can still be improved.

5.3 How does the organizational structure influence the requirements for the information system architecture?

As a result of the research question it is safe to conclude that an organization theory like the Viable Systems Model is a useful aid to determine what use will be made of the information system by the different functions within the organization. The Viable Systems Model creates the possibility to develop a better fit between organization structure and information systems. The Viable Systems Model focuses on the functions that an organization needs to remain viable and their relation to each other. Through the use of these functions a tool is given to determine which functional requirements are needed in the organization. Based on the activities of the functions an indication can be made on the usage of the information systems.

However, the Viable Systems Model cannot be used to determine the non-functional

requirements of the information systems. How the employees that perform the activities in the functions use the information systems concerns the usability of the information systems. These are the non-functional requirements for the information systems. Both the functional and the non-functional requirements are required to make optimal use of the information system.

The functional requirements can be developed from the organizational structure. The five functions of the Viable Systems Model give an indication of the functional requirements in practice. Each function has its tasks and activities based on the structure of the organization. In practice these activities and tasks have been found and thus the functional requirements related to these activities and tasks. However, even though the information systems fulfilled these functional requirements it did not mean that the information systems were optimal.

The reason for this was that the non-functional requirements were not met. Even though the information systems met all the functional requirements, the information systems have problems with the usability. These problems create disturbances within the organization. Through improving the usability of the systems these possible disturbances can be attenuated. The usability can be improved through usability engineering. From the usability engineering the following requirements can be used to improve the usability of an information system: learnability, efficiency, memorability, errors and user satisfaction.

The organization used attenuation of part of the disturbances in the primary activity function by implementing the new dialog support system. The project for the dialog support system was focused on improving the usability of the information system.

The organization structure clearly influences the requirements. The activities performed by the functions in the organizational structure determine demands and wishes for the information systems. Based on the demands and wishes the requirements are determined for the information system. From each function there are demands and wishes which lead to requirements for the information system. The organization structure is a good aid to use when designing information systems. It allows the developers to determine all the demands and wishes for all the functions. However it is important to look at the functions of the system, the functional requirements, as well as the usability of the systems, the non-functional requirements. The functional requirements have to be determined per function to create the best information system possible and the non-functional requirements can be found in usability engineering literature and can be used for all of the functions.

5.4 Recommendations

First the recommendations for the case will be given. After these the broader recommendations are given.

Case

The functional requirements in the customer service department have been met. The only exception is the log of the schedules for the Verint system. The recommendation is to implement this function in the Verint system.

For the non-functional requirements improvements still can be made. The usability of the information systems leave something to be desired. With the implementation of the new dialog support system a step in the right direction has been made. The recommendation is to repeat this process for the other systems used by the functions in order to improve the usability of the other systems.

Broader recommendations

When implementing a new information system it is important to take into account not only the functional requirements, but also the non-functional requirements. An information system can have all the functions it needs, but still have problems in the usability of the system.

In the optimization of an information system, with respect to the usability of the information system, it is important to involve the end-users of the information system. This allows for an evaluation of the proposed design of the system. The evaluation by the end-user improves the usability of the system (Lee & McCrickard, 2007).

The Viable Systems Model can be used to keep in mind the relations between the different functions and with the different levels of recursion in an organization when developing an information system. The relations between the functions can be forgotten when only looking at the specific activities performed by the end-users and can cause the implementation of an information system to fail.

5.5 Theoretical reflection

The Viable Systems Model is a useful aid in determining the functional requirements of an information system. However in the study it became apparent that this is not enough for the creation of an information system. The Viable Systems Model is useful to determine the

functional requirements of a system. However the model does not take into account the non-functional requirements of an information system. The usability of the information system is of importance to make the information systems as good as possible. The problem is that there is no integrated approach in requirements engineering to develop these functional requirements and non-functional requirements. This is also found as a problem in the case. The information systems meet all the functional requirements, but the usability requirements are not met, which leads to problems.

Even though the Viable Systems Model does not lend itself for the non-functional requirements, it can still be used to develop a generic template for an information system. This template can then be adjusted to the organization. By combining this template with the usability engineering literature an integrated approach can possibly be made in information systems development.

5.6 Limitations

A limitation of this master thesis is that it was only possible to verify the requirements for three of the five functions. The conclusion would be more complete if all the five functions could be studied.

Another limitation was that there was only access to a limited number of people for the interviews. For example in case of the project for the new dialog support system it was only possible to interview the project manager. This was because the project had already ended.

The internal validity of this study has been improved by observing first-hand accounts of the events and processes in the organization. The semi-structure interviews do decrease the internal validity as the structure causes the interview to go in a certain direction (Bleijenbergh, 2013). The interviews deviated from the structure to further study the problems with usability, which was added to the operationalization. However, the informal conversations did improve the internal validity as these were not structured.

The external validity of this study is limited as this is a single case study. The findings that the functional requirements developed from the Viable Systems Model are not enough to create an optimal system is generalizable. This is also the case in a different organization. The external validity has been improved through the use of the operationalization in the coding. This makes the data found in the case more generalizable.

The applicability of the study is good as the insurance company can use the finding in this study to help improve the information systems it uses in the customer service department.

Triangulation has been used to improve the quality of the study. Different sources have been used to improve the collected data. The semi-structured interviews improved the reliability as this allowed the fact that the same interview questions were used in each interview.

5.7 Suggestions for further research

The influence of information systems on the organizational structure can be a point of interest for further research. This is the other side of this study.

Another suggestion is that this study is conducted within a larger organization or department in which all five of the functions can be studied instead of three of the functions.

The concept of attenuation and amplification in information system theory could also be an interesting subject to study in further research. The attenuation of disturbances in information systems and the amplification of the regulatory potential to deal with the remaining disturbances in the information system.

The development of an integrated approach to developing functional requirements from organizational structure theory and non-functional requirements from usability engineering can be an interesting suggestion for further research. This could solve the problem that a lot of implementations of information systems fail.

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7. Appendix

Interview 1

Primary function

Hoe is de organisatie globaal opgebouwd?

1. Bij welke afdeling vindt de productie van het process/product binnen de organisatie plaats?
 - a. Hoe zijn de functies van deze afdeling verdeeld?
 - b. Welke taken behoren tot deze functies?
 - c. Welke informatiesystemen hebben deze mensen tot hun beschikking?
2. Welke afdelingen zijn ondersteunend bij deze productie?
 - a. Hoe zijn de functies van deze afdeling verdeeld?
 - b. Welke taken behoren tot deze functies?
 - c. Welke informatiesystemen hebben deze mensen tot hun beschikking?

Coordination function

1. Welke afdeling coordineert de processen binnen de organisatie?
 - a. Hoe zijn de functies van deze afdeling verdeeld?
 - b. Welke taken behoren tot deze functies?
 - c. Welke informatiesystemen hebben deze mensen tot hun beschikking?
2. Welke afdeling zorgt ervoor dat de middelen binnen de organisatie verdeeld worden?
 - a. Hoe zijn de functies van deze afdeling verdeeld?
 - b. Welke taken behoren tot deze functies?
 - c. Welke informatiesystemen hebben deze mensen tot hun beschikking?

Control function

1. Is er één afdeling die de productie monitort, de doelstellingen bepaalt voor de productie en audits uitvoert? (zo niet ga naar 2.)
 - a. Welke afdeling is dit?
 - b. Hoe zijn de functies van deze afdeling verdeeld?

- c. Welke taken behoren tot deze functies?
 - d. Welke informatiesystemen hebben deze mensen tot hun beschikking?
2. Welke afdeling monitort de productie?
- a. Hoe zijn de functies van deze afdeling verdeeld?
 - b. Welke taken behoren tot deze functies?
 - c. Welke informatiesystemen hebben deze mensen tot hun beschikking?

Welke afdeling bepaalt de doelstellingen waaraan de productie moet voldoen?

- a. Hoe zijn de functies van deze afdeling verdeeld?
- b. Welke taken behoren tot deze functies?
- c. Welke informatiesystemen hebben deze mensen tot hun beschikking?

Welke afdeling voert audits uit?

- a. Hoe zijn de functies van deze afdeling verdeeld?
- b. Welke taken behoren tot deze functies?
- c. Welke informatiesystemen hebben deze mensen tot hun beschikking?

Interview 2

Information need

- Kan je alle informatie krijgen die u nodig heeft om je taken uit te voeren?
 - Kan je alles in één keer raadplegen?
 - Is de informatie die aangeleverd wordt gelijk bruikbaar?
 - Staan alle gegevens die u nodig heeft in de schermen?
 - Is het mogelijk om informatie op te zoeken? (zoekfunctie)
 - Is alle informatie die u nodig heeft voor u toegankelijk?
 - Komt de informatie uit meerdere systemen? Zo ja, is het mogelijk om dit allemaal tegelijk weer te geven?
- Ondervindt u problemen met het verkrijgen van informatie die u nodig heeft? Zo ja welke?

Information manipulation

- Zijn alle gegevens beschikbaar als u iets wilt wijzigen?
- Kan je in het systeem alle wijzigingen doorvoeren?
- Zijn er dingen die u niet in met het systeem kunt wijzigen?
- Is het mogelijk om dingen te verwijderen?
- Zitten er beveiligingen op zodat er niet iets onterecht verwijderd wordt?

Information generation

- Kunt u vastleggen wat u wilt vastleggen?
- Zijn andere systemen die daarvoor nodig zijn ook beschikbaar?
- Zijn er gevallen wanneer u iets niet kan vastleggen?

Zijn er nog functies die voor u ontbreken binnen het huidige systeem?

Ondervind u problemen gerelateerd aan het systeem bij het uitvoeren van uw taken?

Interview 3

Interview met betrekking tot de gebruiksvriendelijkheid.

- Wat heb je als opdracht gekregen om te maken?
- Waarom is dit project opgestart?
- Welke taken zijn geprobeerd te ondersteunen met het nieuwe systeem?
- Had je al hiervoor al kennis van deze taken?
- Waarom is voor deze functionaliteiten gekozen?
- Zijn deze functionaliteiten vanuit jullie als opdrachtgever gekomen of zijn deze gekozen door ontwikkelaar?
- Welke tekortkomingen van de vorige systemen is geprobeerd te verbeteren met deze systemen?

- Hoe is het proces van het ontwikkelen van het systeem verlopen? Hoe verliep de interactie tussen jullie en de uitvoerder?
- Welke stappen zijn hierbij genomen?
- Waar haalden jullie de informatie voor de activiteiten die met het systeem uitgevoerd worden vandaan?
- Hoe zijn deze activiteiten vertaald naar aspecten van het systeem? Op welke wijze dit plaats vond.
- Wijkt dit systeem af van het systeem waar jullie initieel om vroegen? Zo ja, hoe komt dat dan en welke aspecten wijken af?
- Hoe verloopt de interactie tussen de gebruiker en het systeem? Hoe krijgt de gebruiker de informatie naar voren die hij nodig heeft voor het uitvoeren van de taken?
- Welke informatie wordt getoond via dit systeem?
- Welke informatie is bewust voor gekozen om niet te tonen in het systeem?
- Zijn er nog dingen die ontbreken of later toegevoegd worden?

Coding example

Primary activity function

Information need	Availability of the information	Customer support agent 1: Alle informatie die je nodig hebt kun in eigenlijk wel bij komen ja, soms is dat niet altijd even eenvoudig. We hebben verschillende backoffices die natuurlijk afgeschermd informatie in kunnen zien maar opzich is alles wel te vinden ja.
		Customer support agent 1: bijvoorbeeld een klantbeelapplicatie, daar is dan eigenlijk alle klantgegevens die kunnen we grotendeels muteren.
		Customer support agent 2: DO om de antwoorden in op te zoeken.

		Observation: The customer information system is used for the financial information and personal information of the customer. The dialog support system is used to find which healthcare costs are reimbursed.
	Usability of the information	Observation: The old dialog support system uses lists which lead to lists in order to find the right information. Takes time to learn where to find the information and it takes time to actually find the information during a conversation. Customer support agent 1: Ja het is uiteindelijk wel toegankelijk, maar nogmaals je moet wel je routes kennen en je applicaties kennen om te weten waar je iets moet vinden.
	Accessibility of the information	Customer support agent 1: Nou bepaalde informatie kan natuurlijk om medische privacy redenen gewoon afgeschermd zijn dus het is logisch dat je die niet inziet.
Information manipulation	Possibility to change information	Customer support agent 1: nou er zijn gevallen waarbij het niet zelf te doen is maaar dat wordt dan bijvoorbeeld polisadministratie die dat dan aanpast end at sturen wij per mail door en de meeste aanpassingen kunnen gewoon... ja het is qua aanpassingen een beetje raar, het ligt aan de mutatie die je moet doen. Alle mutaties die we live doen doen we in de klantbeelapplicatie, alle mutaties die eigenlijk via de backoffice afgehandeld moeten worden doen we via de DO of via de email. Customer support agent 2: Nee sommige dingen kan je niet aanpassen, sommige dingen gaan bijvoorbeeld via een andere afdeling zoals polisadministratie.

		Customer support agent 2: , OHISS om de klantgegevens aan te passen.
		Observation: The OHISS, the insurance policy system is used to change the insurance packages and method or frequency of payment.
	Possibility to delete information (Intentional)	Customer support agent 1: Nou het enige wat wij aan een klantgegevens kunnen muteren zijn eigenlijk alleen de gegevens eromheen zoals telefoonnummer of emailadres. Voor de rest kunnen wij eigenlijk geen gegevens verwijderen uit een database.
	Possibility to delete information (unintentional)	Customer support agent 2: Nee volgens mij is alles wel beveiligd.
Information generation	Possibility to add information	Customer support agent 1: Ja we hebben gewoon vrije vakken dus opzich kan je wel alles kwijt. Ja of het de meest ideale werkwijze is, niet altijd denk ik want we werken nu op vraagbasis van de klant. Dus ja je zou heel veel als ze meerdere vragen hebben moet je meerdere momenten noteren. Het kunnen ook randzaken zijn die neem je op in die momenten, maar daar heb je niet echt aparte ruimte voor.
		Observation: These notes are made in the dialog support system. It can done in the customer information system, but this is only in case of emergency. The notes are related to the question in the dialog support system.
		Informal conversation: The reason for the notes made in the dialog support system: In this way there is a uniform way of categorizing the subjects of the conversations.