How to get system usage in gear?

Exploring and utilizing unanticipated work practices

Ruud Vroon

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PREFACE

This thesis is the result of a research on postadoption unanticipated usage of information systems, and serves as a final assignment for the master Business Administration (Information Management track).

The research was carried out at the Klanten Support Desk, a department of KPN B.V located in Enschede, under the supervision of Susanne van Bruggen (Manager KSD at KPN), Ton Spil (University of Twente) and A. Arviansyah (University of Twente).

There are many people who helped and supported me during my graduation project, to whom I owe much gratitude. First of all, I would like to thank Susanne van Bruggen, for giving me the opportunity to carry out my research at KPN, for supporting me during the research and introducing me in the complex infrastructure of KPN. I would also like to thank Ton Spil and A. Arviansyah for their support during the writing of my thesis and providing me with the hard needed advice in the times I got stuck. Furthermore I would like to thank all the agents at KPN who participated in the interviews and observations, for their time and valuable information. And last but not least I would like to thank my friends and family for their support to finish my thesis.

Ruud Vroon
Enschede, July 2013

SUMMARY

This thesis is about post-adoption unanticipated use, which is defined as non-compliant user behavior that occurs after the initial implementation of an information system. The literature on the design, development and implementation of IS often takes a black-box approach to this "unanticipated use" phenomenon. In order to develop or improve future information systems there is however a need to understand why this phenomenon occurs and how it can be predicted, such a study however could not be found. This thesis set out to further investigate the phenomenon of post adoption unanticipated usage and therefore, the following research question was formulated:

> *How can a better understanding of unanticipated usage of information systems help us to improve future information systems?*

Two goals were defined for this research. The first goal was to gain insight in the phenomenon unanticipated use, how can it be discovered and classified and why does it occur, and determine if can be used for information system development, and the second goal was to construct recommendations on how knowledge about unanticipated use can be utilized in the development of new systems.

In order to achieve the research goals, and thereby answering the research questions, a research design was constructed. This research design can be divided into two parts; a literature review, which aims to clarify the concept of unanticipated usage, and an explanatory research to try to understand why it occurs. For this explanatory case study research, which was conducted at the KPN KSD department, a qualitative research method was used in the form of a structured interview framework. Based on this research also some practical recommendations were made to improve the KPN information systems.

Results

This thesis found out that that the taxonomy of system usage (Wilkin & Davern, 2012) is the best way to classify system usage, and thus also unanticipated usage. However we also found a new category for this taxonomy that was not covered before. It is a type of unanticipated usage without consent that does not have harmful effects on the system; we called this type of usage user innovation by individual action. Furthermore this thesis presents a framework to identify unanticipated usage in an organizational setting, this frameworks includes an interview framework that was also used during the case study.

From the case study we learned that low task technology fit is a good predictor of unanticipated usage. The lower the fit the more unanticipated usage practices will occur. Furthermore we found that system usage develops over time and tries to improve the initial fit, thus there are good types of unanticipated usage. These practices however can cause redundancy and other harmful side effects. Therefore it is important to understand how end users use the systems after implementation and adapt the system over time according to the actual usage. Finally this thesis recommends user participation in the system design in order to improve the task technology fit (and getting easy access to information about the actual usage) and thus reducing post-adoption unanticipated use practices.

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LIST OF ABBREVIATIONS

IS	Information System
IT	Information Technology
KPI	Key Performance Indicator
KSD	Klanten Support Desk
MDT	Multi-Disciplinary Team
TTF	Task-Technology Fit

Chapter 1

1 INTRODUCTION

This introduction will outline the background of the conducted research. The current state of scientific literature will be introduced briefly. Also the context in which this research is conducted will be described. The problem definition will be displayed, after which the research goals and questions are presented. Also the theoretical and practical relevance of this research will be addressed. This chapter concludes with a schematic display of the thesis's structure.

1.1 BACKGROUND

Unanticipated use of Information Systems (IS) is a widespread post-implementation phenomenon in organizations (Koopman & Hoffman, 2003). Users interpret information systems structures and make a judgment based on this interpretation, such as to affirm or negate their usefulness. Thus "unanticipated usage" can range from essential workarounds till non-use of a system by the end user (Azad & King, 2008), because even the most restrictive system offers the choice of usage versus non-usage. When users engage with the system but fail to conform to the prescribed "rules of engagement" unanticipated use occurs. This is also commonly referred to as non-compliancy; user behaviors vis-à-vis the intended system design (Azad & King, 2008) or user adaption (Elie-Dit-Cosaque & Straub, 2011).

Users' behaviors such as acceptance of new systems (Venkatesh, Morris, Davis, & Davis, 2003) or resistance to IS implementations (Lapointe & Rivard, 2005) have been a mainstream topic of interest to IS researchers for decades. One fairly overlooked phenomenon is user workarounds (Ilie, 2013). The literature on the design, development and implementation of IS often takes a black-box approach to this "unanticipated use" phenomenon, which results in a lack of theoretical visibility of this phenomenon (Burton-Jones & Straub, 2006; Ciborra, 2002). IS researchers have generally focused their theoretical energies on the intended use of IS, devoting much less attention to unanticipated usage such as computer workarounds. Therefore, the theoretical understanding in the IS literature of the inner workings and dynamics of computer workarounds remains rudimentary (Azad & King, 2008). Thus if we consider unanticipated usage, an underdeveloped field in the scientific literature, there is a need to explore this phenomenon further.

In todays fast moving economy, most firms cannot perform without good information systems. What started with simple business applications, ended with systems that enable inter-organizational cooperation. Dealing with the increased complexity of these systems has been a widely researched topic in IS literature, and has also received much attention in practice. Still many IT project fail to meet their targets, they are either finished too late, over budget or do not meet their requirements. Unanticipated usage is an underestimated phenomenon in this research field that may have a big influence.

Especially organizations that are planning to get rid of legacy systems could utilize knowledge about unanticipated usage of ISs. Usage of these systems is likely to have evolved over time; therefore companies can run into problems when they try to develop new information systems based on the previous systems documentation alone.

IS success has received a lot of attention in IS literature over the years, unanticipated use on the other hand has only recently received a little attention. Seldom are the two concepts combined in order to see how taking the latter into account in development can increase IS success. This is exactly what is studied in the research that is described in this thesis. End users of the current system will be interviewed and observed, while the new system is still in development. The topic of the research can therefore be translated as: "*using undocumented practices of the users, who – directly and indirectly - work with the current system and will have to work with the new system, during the development of a new information system in order to increase information system success.*"

The goal of this research is twofold; the first objective is to gain more insight in the phenomenon unanticipated use, the second objective is to see how the acquired knowledge about unanticipated usage can be utilized.

1.2 THE CURRENT LITERATURE ON UNANTICIPATED USAGE

As mentioned in the previous paragraph, there is a lack of theoretical visibility of the unanticipated usage phenomenon. In order to understand this phenomenon better, this chapter will briefly explore the current state of scientific literature on this subject.

Since unanticipated usage is a subset of system usage this paragraph starts off to explore this concept. 'System usage' or 'use' (DeLone & McLean, 1992) was defined by Burton-Jones and Straub (2006) as an activity that involves three elements: (1) a user, (2) a system, (3) a task. An individual will employ one or more features of a system to perform a task. Sometimes a user will run into a task that cannot be performed by the system (e.g. because of component failure, design flaws or "new" tasks for which the system has not been updated yet) in these cases user can either choose to ignore these tasks or try to find/create a way to accomplish their task. These innovations are also referred to as a computer workarounds, which Koopman and Hoffman (2003) describe as:

> *The alternative path that is created by people, by utilizing their knowledge and experience of an information system, to reach a blocked goal.*

In order to understand system usage we have to consider information systems as social artifacts; open to interpretation during use (Desanctis & Poole, 1994; Wilkin & Davern, 2012). Researchers like DeLone and McLean (2003) and Goodhue and Thompson (1995) linked system usage to organizational success, respectively called net benefits and performance impacts, but these studies adopt a black box approach on the actual usage of a IS. It is important to keep in mind that system usage is affected by the organization. Leavitt (1965) has proposed a model of organizations which includes structure, people, tasks and technology. This is a useful framework because it indicates that changes in the organization's structure may result in changes to tasks, technology and personnel and vice versa.

Some research has been done on how different types of unanticipated usages can be classified (Ferneley & Sobreperez, 2006; Wilkin & Davern, 2012) and why they occur (Elie-Dit-Cosaque & Straub, 2011), but to our knowledge there is no research that combines these subjects and tries to utilize this knowledge.

1.3 RESEARCH CONTEXT

This research study was performed at the Klanten Support Desk (KSD), a department of KPN, located in Enschede. The history of KPN can be traced back to 1852 when the government constructed telegraph lines which it intended to operate itself. In the early 1900s the company also developed publicly owned telephone and postal services. In the late 1900s the company was privatized and the postal services (PTT) where split up from the telephone services (KPN). Currently KPN is the leading telecommunications service provider in The Netherlands. It offers telephony (fixed and wireless), internet and TV to consumers, end-to-end telecommunications and ICT services to business customers.

The KSD department falls under the "business line sales and order fulfilment" within the KPN Customer Contact Centre under Consumer Residential (see Figure for an organogram). The KSD is a second line service desk, the desk is in charge of handling complex order fulfilment issues that KPN customers encounter with their internet, television and/or fixed telephony connection over copper lines.

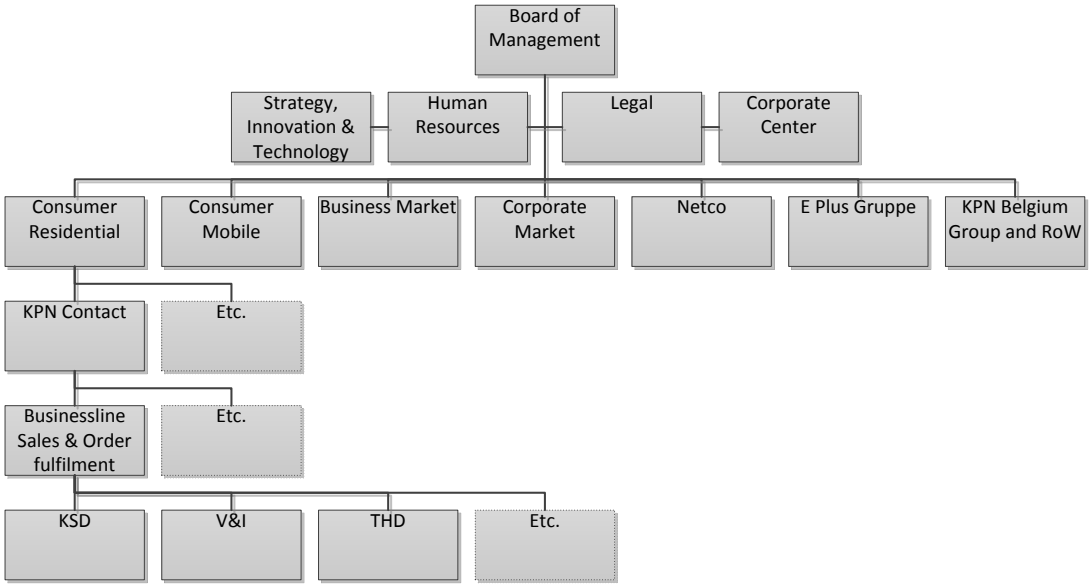

Figure : Organogram KPN 2012

Currently KPN has two "production street" information systems, one for delivering services over the regular copper lines and another one for delivering services over fiber lines. Since maintaining two different production streets is more expensive than maintaining one, KPN decided to start a project with the goal to transfer the copper line services to the fiber production street and fill the gaps between the two production streets. The decision to use the fiber information system was based on the fact that this system is relatively new and was more integrated (±6 instead of ±26 core systems).

The "new" integrated production street should be able to fulfill all broadband orders. The system has to contain all customer information (e.g. current contract, financials, service requests and contact

information), it should be possible to make new orders and it should offer service agents options to analyze and solve customer problems.

1.4 Problem definition, research goals and research questions

From paragraph 1.1 it becomes clear of that a lot of the scientific literature still takes a black box approach on user adaption. The problems can be summarized as:

- It is unclear how users actually use the information systems.
- It is unclear knowledge about unanticipated use practices can be utilized.

The central problem definition can therefore be formulated as:

Problem definition

> *There is no clear understanding of the phenomenon unanticipated use and how it can be utilized.*

1.4.1 Research goals

The problem described in the previous section is a knowledge problem. Since this research aims to solve the problem stated above, the main goal is the provide knowledge on how the phenomenon unanticipated use works. The first research goal can be formulated as:

First research goal

> *Gain insight in the phenomenon unanticipated use, how can it be measured and classified and why does it occur.*

The gathered knowledge will be used to provide professionals with recommendations to successfully utilize insights in undocumented practices. Therefore the second research goal of this thesis can be formulated as.

Second research goal

> *Construct recommendations on how knowledge about unanticipated use can be utilized in the development of new systems or to improve current systems.*

1.4.2 Research questions

In order to fulfill the research goals of this thesis, described in the previous section, the following research question was formulated:

Research question

> *How can a better understanding of unanticipated usage of information systems help us to improve information systems?*

This research question was split up in these sub-questions:

Sub-Questions

- *What is post-adoption unanticipated use?*
- *What categories of system usages can be distinguished?*
- *How do you measure unanticipated usage?*
- *How and why does post-adoption unanticipated use occur?*
- *How can the knowledge about unanticipated usage be utilized?*

1.5 RELEVANCE

Although previous paragraphs have shown why this research is conducted, this paragraph shortly highlights the relevance of this research. This section starts with the theoretical significance. After that the practical significance for KPN will be discussed.

1.5.1 Theoretical significance

Ciborra (2002) states there is a lack of research about non-compliant or unanticipated use of information systems. Most of the literature that exists on this subject has been dominated by negative connotations associated with this type of use (Ferneley & Sobreperez, 2006), often concluding that it is undesirable and detrimental to an implementation's success (Kossek, Young, Gash, & Nichol, 1994; Schein, 1988); that it is a product of employees' opposition to control and dominate (Cook & Brown, 1999); and that it inhibits strategic change (Ansof, 1988; Leavitt, 1965). Wilkin and Davern (2012) on the other hand embrace the novel view, wherein unanticipated usage or user innovations are viewed as both inputs to system revisions and techniques to measure system success. This thesis will build on this view.

Some research has been done on classifying usage of information systems (Ferneley & Sobreperez, 2006; Wilkin & Davern, 2012), which can be used as a starting point to develop an approach that acknowledges unanticipated usage in the development of future IS releases.

1.5.2 Practical significance for KPN

KPN is currently developing a new information system to fulfill broadband orders. The system should not only be able to fulfill broadband orders, but should also empower the customer service department with tools to log and solve problems. For this KPN project only documented use of the old information systems are in scope. The decision not to take workarounds into account might impose a threat for the operations, because some workarounds provide essential operational services (Ferneley & Sobreperez, 2006). Moreover the documented use might take some assumptions that are already proven wrong, which will increase the risk of IS failure. This paper will provide KPN with a recommendation on how to utilize the acquired knowledge about the unanticipated.

1.6 THESIS STRUCTURE

This research is divided into five parts. The first chapter is the introduction. This part consists of an orientation study of the research topic to gain insights on the issues that need to be addressed, an overview of the research field and KPN. The problem definition and the research goals will also be presented in this chapter.

The methodologies used for both the literature research as well as the case study will be described in chapter two. The third chapter will contain the results of the in-depth scientific literature research. Then the result of the case study, which was conducted at KPN, will be presented in chapter 4. In Chapter 5 the results of the literature and case study will be analyzed. This chapter will also include some recommendations for KPN.

The last chapter will contain the conclusion, limitations of this research and implications for further research. A schematic structure of the chapters is depicted in Figure .

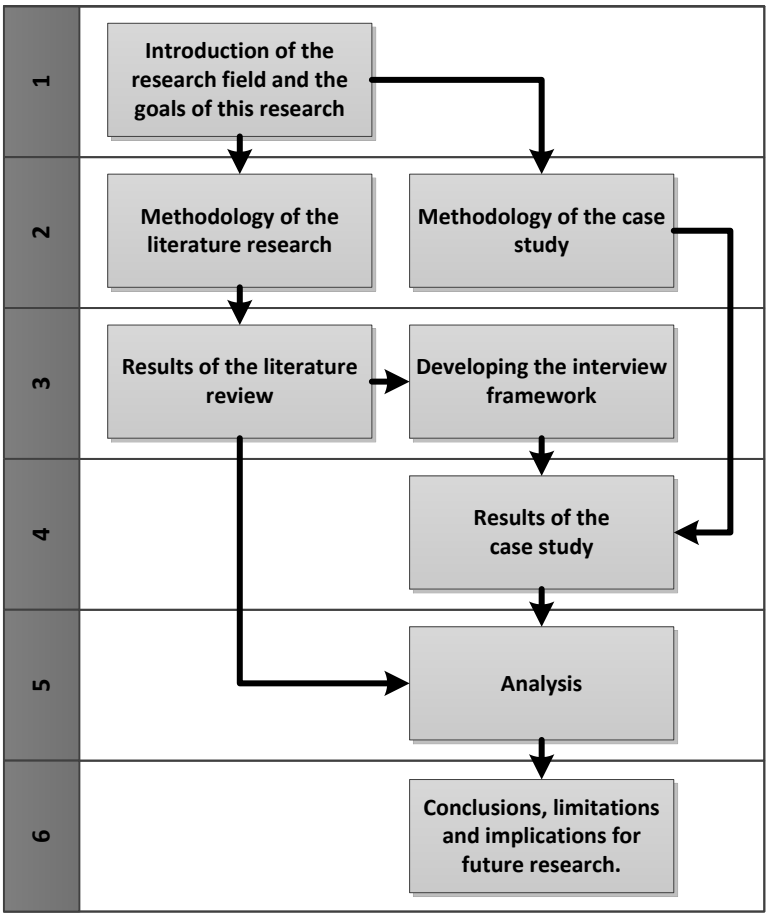

Figure : Structure of the research; subjects per chapter.

Chapter 2

2 METHODOLOGY

This chapter will describe the methodologies used in this thesis. The first section of this chapter will describe the methodology used for the literature review. We chose to do a literature research, because using prior research is very important. The results of the literature review are presented in the chapter 3. The second section of this chapter will describe the case study method used to collect data about the unanticipated usage of information systems.

2.1 LITERATURE RESEARCH

The main goal of the literature review is to find information about unanticipated use. A literature review was used, because on that way we can learn from and build on what others have done rather than working alone.

This paragraph will explain how the literature review was conducted. First the selection criteria were drawn up. After that the search engine and the major keywords we selected. Finally a selection of articles is made, based on the results of the search queries.

2.1.1 Selection criteria

The main selection criterion is the relevance to the research questions. Besides that, additional criteria are formulated:

- Articles of high scientific importance will be used for this literature review. Therefore articles that are published in one of the top 25 IS journals were included (Schwartz & Russo, 2004).
- Only articles published over the past 10 years were included.
- Only influential articles are selected for this review. Articles must be cited at least five times, except for the articles published in 2011 and 2012; for these younger articles no citation criteria were used.
- Exceptions on these criteria are made for literature that is found using backward and forward search techniques.

2.1.2 Selection of the search engine

Many online search engines for scientific literature are available, not all these engines are suitable for searching within the top 25 IS articles. Out of ‘Scopus’ and ‘web of science’, that both cover 92% of these

top journals, 'web of science' was selected because of its ease of use. 'Communications of the AIS' and 'Information and Organizations' are not included in web of science and were therefore hand-searched.

2.1.3 Keyword selection

Even though post-adoption unanticipated information system usage is a widespread phenomenon there are many ways to refer to this phenomenon in scientific literature. In order to get a comprehensive collection of the available literature the following keywords are included:

- Unanticipated us*
- System us*
- Workaround
- User adaptation
- User innovation
- Appropriation

Since the words use and usage are used as interchangeable by many researchers, the us* keyword will be used to include both. Also quotes are used to search for a specific combination of keywords. The keywords, combined with the selected articles resulted in the following query:

Topic=(
"unanticipated us*" OR
"system us*" OR
workaround OR
"user adaptation" OR
appropriation OR
"user innovation")
Publication Name=(
"MIS Quarterly Management Information Systems" OR
"Information Systems Research" OR
"Communications of the ACM" OR
"Management Science" OR
"Journal of Management Information Systems" OR
"Artificial Intelligence" OR
"Decision Science" OR
"Harvard Business Review" OR
"IEEE Transactions" OR
"AI Magazine" OR
"European Journal of Information Systems" OR
"Decision Support Systems" OR
"IEEE Software" OR
"Information and Management" OR
"ACM Transactions on Database Systems" OR
"Journal of Computer and System Sciences" OR
"Sloan Management Review" OR
"ACM Computing Surveys" OR
"Academy of Management Journal" OR
"International Journal of Electronic Commerce" OR
"Information Systems Frontiers" OR
"Journal of Management Systems" OR
"Organization Science" OR
"IEEE Computer" OR
"Information Systems Journal")
Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH.
Lemmatization=On

2.1.4 Selection of the articles

The search query shown in section 2.1.3 was entered in web of science on January 24, 2013 and returned 186 articles. After applying the age criteria 80 articles fell off. After the citation constraint 90 articles remained. These articles form the base collection. Having identified the base collection, these articles were reviewed. First a rough selection is made based on the articles' abstract. After this the selection is refined by reading the remaining articles. While reading the full articles some other relevant articles were identified (bottom up searching). The selection process and the resulting numbers are shown in Figure . A list of all the relevant articles can be found in chapter 3.4.

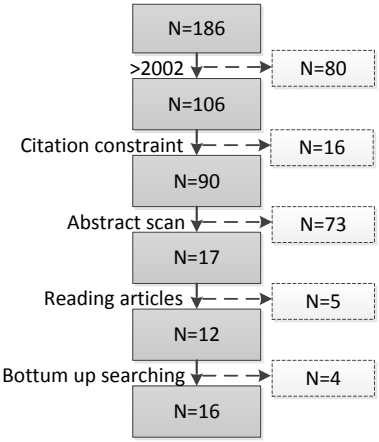

Figure : Application of the search criteria

2.2 CASE STUDY

Three conditions can be used to pick the most suitable type of research; (a) the type of research question posed, (b) the extent of control an investigator has over actual behavioral events, and (c) the degree of focus on contemporary versus historical events (Schwartz & Russo, 2004). In this thesis a lot of how and why questions need to be answered, there is no control over behavioral events and the focus is on contemporary events. According to Schwartz and Russo (2004) the most suitable research method for this situation is a case study, to help understanding the phenomena in practice. A case study requires a qualitative research to understand all variables. Action research would have been an applicable research as well; however this type of research would require more time and would therefore not be suitable within the available time for this thesis.

The holistic single-case study started in September 2012. Evidence collection was done by direct observation, individual semi-structured interviews and document analysis. The goal of this case study is to collect data and to make knowledge explicit about the unanticipated usage of information systems phenomenon, the study also explores why adaptations were developed by end users.

This paragraph will describe how the case study was conducted. First the research design is presented, and then the scope of the case study is defined. Thirdly the used evidence collection methods are described. Then the data analysis method is presented. This paragraph will finish with information about the research validity.

2.2.1 Research design

This case study is designed in order to help answer the research questions of this thesis. There are several categories of case study, namely exploratory, descriptive and explanatory case studies (Yin, 2009). This case study is an explanatory case study, because it investigates the phenomenon "unanticipated usage", develops theories on why it occurs, and explores how this knowledge can be utilized.

Unit of analysis
The unit of analysis is the major entity that is being analyzed in the study. Therefore “unanticipated usage of information systems” is the unit of analysis of this research. The unit of analysis should not be confused with the unit of observation, in this case the end users of the information system at KPN.

Sample selection
Interviews are held with nine employees that were randomly selected from the 181 employees of the KSD department of KPN. A list of all the employees was available to the researcher; on this list every employee was appointed a unique number. By randomly selecting nine numbers, and therefore nine random employees, selection bias was avoided.

2.2.2 Scope of the case study

The available time for this thesis is not enough to focus on all the ± twenty-six core systems of the current delivery street (new agents get four weeks of formal training and it takes them approximately one year to become an all-round employee). Therefore the scope of this research will be a selection of applications. The selection contains applications that are all used on a daily basis by all KSD agents. The selected applications contain all functions to manage (incoming) customer cases and/or to record information about the calls. This is an overview of the applications in scope and their functions:

Siebel CM: The KPN CRM system for copper line customers, based on Oracle’s Siebel CRM, developed to present an overview of the available customer information and enable employees to analyze customer problems. An agent is required to make notes on all conversations with customers in this program. Siebel CRM will also be used as a base for the “new” integrated production street.

KANA: An advanced email client that is used to divide incoming emails (customer cases) from other departments into several workflows. Each workflow has its own priority and SLA, teams or individual employees are assigned to a certain workflow in order not to break the SLA. KANA cases are not appointed to an individual employee.

KADO: A program to keep track of complex customer cases. These cases require multiple calls with the customer. Agents keep track of the current situation, the desired situation, executed actions, promises made to the customers, and what steps are required to deliver the required information. This program also offers a function to financially compensate customers. KADO cases are generally appointed to an individual employee, customers therefore only talk to one KPN employee that knows the story behind the case.

MAM: A self-build access database that is used to keep track of what the agents did on a day (agents need to fill in their own information). This program also loads information from KADO, so agents can see which customer cases are scheduled for that day. Every employee is able to see what cases are scheduled for their colleagues, which enables to pick up the work if a colleague is absent. Another function of this database is the learning loop, which enables KSD employees to provide other departments with feedback.

2.2.3 Interviews

Nine interviews of approximately 60 minutes were held with nine randomly selected end users of the information systems to determine if actual work practices deviate from designed work practices, why this is

the case and explore how a company can utilize the knowledge about these adaptions. These interviews were held on site in March 2013 and included three types of employees: Troubleshooters (lot of experience), 'standard' employee (average experience) and new employees (little experience). From each of these groups people were randomly (via the MATLAB randi() function) selected. Findings from these interviews are mainly qualitative. A semi-structured interview template is used to guide the interview; this template is attached in Appendix A and explained in chapter 3.4.

2.2.4 Interview framework

The main goal of the interview is to get more insight into the phenomenon unanticipated usage in the post-adoption phase of an information system. This post-adoptive behavior is defined by Jasperson, Carter, and Zmud (2005) as the myriad feature adoption decisions, feature use behaviors, and feature extension behaviors made by an individual user after an IT application has been installed, made accessible to the user, and applied by the user in accomplishing his/her work activities. Consequently this interview:

- analyses system usage,
- examines why this usage occurred;
- identifies particularly problems that have led to unanticipated usage;
- explores how knowledge about unanticipated usage can be utilized.

The interview framework can be found in Appendix A and is divided into six sections, namely personal information, training, system quality, task technology fit, IS features and adaptation behaviors. Why these sections were chosen and a further explanation of these concepts can be found in paragraph 3.4. By combining these different concepts, this research will capture a more complete understanding of unanticipated usage and its drivers.

2.2.5 Available documents

Documents that are available to the KSD department about the information systems are analyzed to validate the findings from the interviews. These analyzed documents, mainly work instructions, were used to acquire knowledge about the designed usage and/or documented user innovations. The available documents are critically reviewed, since the documented work practices in these documents can deviate from the actual work practices in the real world at the KSD.

2.2.6 Direct observations

Because the case study takes place in the natural setting of the "case", there is an opportunity for direct observations. The observations include attending meetings and observing general work activities by agents. The goal of direct observation was to find out how employees actually work with the system, and how they interact with colleagues about IT problems. Also some information about the development of the new information system was collected by attending several meetings. The researcher made notes about the observations.

2.2.7 Data analysis and validity

Only qualitative data is collected for this study. Within-case analysis is therefore the best data analysis method. In the within-case analysis approach, the concepts from one source are compared to another

source in the same case. Differences and similarities between the sources are described based on this analysis. For this analysis, the interview transcripts, direct observations, and available documentation are used as a data source.

Four tests have been commonly used to establish the quality of empirical social research. Because case studies are one form of such research, these tests are relevant to case studies. The four tests are (Yin, 2009):

- *Construct validity*: identifying correct operational measures for the concepts being studied.
- *Internal validity*: seeking to establish a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationship.
- *External validity*: defining the domain to which a study's findings can be generalized.
- *Reliability*: demonstrating that the operations of a study – such as data collection procedures – can be repeated with the same result.

Yin (2009) argues that these tests should be applied throughout the case study process: during design, data collection, data analysis and reporting. Following these recommendations will "increase the quality of your case study tremendously, and overcome traditional criticisms of the weakness of case study research". Table summarizes 11 recommended tactics covering theses four tests and also indicates the ways in which the research design and conduct for this case study responded to these recommendations.

Tests	Case Study Tactic	Research Phase in which tactic occurs	Action taken in this research
Construct validity	Use multiple sources of evidence	Data collection	Use of interviews, documentary evidence and direct observations.
	Establish chain of evidence	Data collection	Interview data both taped and transcribed in real time.
	Have key informants review draft case study report	Composition	The draft case study report will be reviewed by the manager of the department in which the research was conducted.
Internal validity	Do pattern matching	Data analysis	Analysis was based on three different models, namely: TTF, FAM and IS Success model.
	Do explanation building	Data analysis	Analyzing case study data by building an explanation about the case & identifying a set of causal links.
	Do time series analysis	Data analysis	Not performed in this research.
	Do logic models	Data analysis	Not performed- requires time series data.
External validity	Use rival theories within single cases	Research design	Not used because of exploratory nature of research and lack of existing theory.
	Use replication logic in multiple-case studies	Research design	Not performed – requires multiple cases.
Reliability	Use case study protocol	Data collection	Same data collection procedure followed for each case; consistent set of initial questions used in each interview.
	Develop case study database	Data collection	Interview recordings, transcripts and notes were collected.

Table : Case study tactics for four design tests (Yin, 2009)

Chapter 3

3 THEORY

In the previous chapter the research design was explained. This chapter presents the results of the literature review. The first paragraph will describe the definitions of the concepts used in this thesis. Paragraph 3.2 will explain the concept of unanticipated usage and the difference between that concept and resistance. Then the different categorizations of system usage in the literature will be discussed. Paragraph 3.4 will zoom in on the causes of unanticipated usage; this will be the base of the interview framework. We will finish this chapter with information about the utilization of the knowledge about unanticipated usage; a subsection of this paragraph will also explore user participation.

3.1 DEFINITIONS OF CONCEPTS IN THIS THESIS

Several different concepts are used in this research and especially in this chapter. This paragraph will give definitions for the most frequently used concepts. Starting with these definitions will give a clear overview of the different concepts and how they are connected to each other.

Concept	Definition
Appropriation	The act of taking technology and deploying it for your own use, either by directly using the structures; relating it to other structures (such as the task or environment); constraining or interpreting the structures as they are used; or making judgments about the structures (such as to affirm or negate their usefulness) (Wilkin & Davern, 2012).
Post adoption	The stage after the implementation of an information system in which various features of an IT application are resisted, treated with indifference, used in a limited fashion, routinized within ongoing work activities, championed, or extended (Jasperson et al., 2005).
Resistance	Behavioral reactions expressing reservation in the face of pressure exerted by change supporters seeking to alter the status quo (van Offenbeek, Boonstra, & Seo, 2012).
Spirit	The "official line" which the technology presents to people regarding how to act when using the system, how to interpret its features and how to fill in gaps in procedures which are not explicitly specified (Desanctis & Poole, 1994).
System usage	An activity that involves three elements: a user, i.e. the subject using the IS, a system, i.e. the object being used, and a task, i.e., the function being performed (Burton-Jones & Straub, 2006).
Unanticipated usage	Non-compliant user behaviors (Azad & King, 2008).
User participation	A set of behaviors or activities performed by the user in the system development process (H. Barki & Hartwick, 1989).
Workaround	The alternative path that is created by people, by utilizing their knowledge and experience of an information system, to reach a blocked goal. (Koopman & Hoffman, 2003).

3.2 WHAT IS POST-ADOPTION UNANTICIPATED USE?

To explain the concept of unanticipated usage we first have to explain what is meant by system usage. Burton-Jones and Straub (2006) described system usage as an activity that involves three elements: (1) a user, i.e. the subject using the IS, (2) a system, i.e. the object being used, and (3) a task, i.e., the function being performed. Individual-level system usage is defined as an individual user's employment of one or

more features of a system to perform a task. Unanticipated usage can be described as non-compliant user behavior (Azad & King, 2008), systems usage that was not intended when the system was designed. Studies of system usage often measure 'normal usage' as a means of validating system success (Pekkola, 2003); on the other hand some authors argue that the deepest form of engagement is system usage in an unanticipated way (Wilkin & Davern, 2012). This study underwrites the latter.

Jasperson et al. (2005) distinguish three high-level stages of adoption, namely: pre-adoption activities, the adoption decision, and post-adoption activities. Much of the previous research is centered on the first two stages: during the first stage researchers try to predict the IS success and during the second stage much research has been done on the adoption of innovation. In the post-adoption stage, after the implementation of an information system, various features of an IT application are resisted, treated with indifference, used in a limited fashion, routinized within ongoing work activities, championed, or extended. This stage is therefore the most interesting if you want to explore unanticipated use practices that are developed by end users.

In order to understand how users engage with as information system, we have to accept that systems are not merely engineered artifacts; they are social artifacts - open to interpretation and appropriation by users (Desanctis & Poole, 1994; Germonprez, Hovorka, & Collopy, 2007). In order to understand more about the social nature of a system we borrow two concepts from the Adaptive Structuration Theory, namely spirit and appropriation:

Spirit is a property of the technology as it is presented to users. It is not the designer' intensions – these are reflected in the spirit, but it is impossible to wholly realize their intents. Nor is the spirit of the technology the users' perception or interpretations of it – these give us indications of the spirit but are likely to capture only limited aspects (Desanctis & Poole, 1994). The spirit can therefore be defined as the "general intent" of something as in "spirit of the law". The original spirit of the system relates to the expected usage of the designed functionalities. Early on when a technology is new, the *objective* spirit is put forth by the designers and is evident in the pronouncements (e.g. through manuals or marketing literature) about the values and goals of the system and how it "should" be used. Later as users encounter and use the system, they initiate their usage behaviors, resulting in a *subjective* conception of the system's spirit.

Appropriations are not automatically determined by technology designs. Rather, people actively select how technology structures are used, and adoption practices vary. Groups actively choose structural features from among a large set of potentials. Given the availability of technology structures, groups may choose to: (a) directly use the structures; (b) relate the structures to other structures (such as structures in the task or environment); (c) constraint or interpret the structures as they are used; or (d) make judgments about the structures (such as to affirm or negate their usefulness). Groups may choose to appropriate technology features faithfully or unfaithfully. The features are designed to promote the technology's spirit, but they are functionally independent and may be appropriated in ways that are not faithful to the spirit. Faithful appropriations are consistent with the spirit and structural feature design, whereas unfaithful appropriations are not. Unfaithful appropriations are not "bad" or "improper" but simply out of line with the spirit of the technology (Desanctis & Poole, 1994).

Spirit is used in this thesis in the categorization of unanticipated usage. Circumventions and user innovations are both unfaithful to the spirit of the technology. The concept of appropriations is used to describe the process of developing new ways to use the system; which results in unanticipated usage.

The main difficulty in unravelling the true nature of unanticipated usage lies in the truism that a true spirit does not exist, “characteristics of the material artifact, the charateristics of the human agents who use it, and the nature of the context in which it is used” all have a certain influence (Wimelius, 2011). In other words, unanticipated usage is be discovered at the meeting pointof technology and users, that is where the technological component of a socio-technical setting meets the social and human side of such setting, when the “technological artifact” is put “in use” and becomes a “technology-in-practice” (Orlikowski, 2000).

On a common sense level, workarounds are perceived as positive whenever the intentions lying behind are recognized aimed at overcoming the perceived shortcomings of a technology, or at pragmatically managing unusual circumstances and problem situations that always occur even in the most accurate workflow (Cabitza & Simone, 2013); conversely, workarounds are perceived as negative, when they seem to be motivated by an ungrounded intention to resist the technology (Beaudry & Pinsonneault, 2005),or as resulting from underrating the potential negative consequencesderiving from the misuse, non use or even sabotage of the supportive technology (Ferneley & Sobreperez, 2006).

In summary when an information system is introduced; users start using the system (system usage) mainly in the prescribed manner. In the post-adoption stage users that applying appropriation changes to reach their goals, which were previously blocked (Koopman & Hoffman, 2003). The causes for these adaptations will be discussed in paragraph 3.4. These appropriation changes can either be in line with the spirit of the system or not, this does however not make this unanticipated usage “bad” or “improper”.

3.2.1 Post-adoption unanticipated usage versus resistance

There is a link between the concept of post-adoption unanticipated usage and user resistance to information systems. In this section the concept of user resistance is introduced and followed by an explanation of the differences between these two concepts.

Coch and French (1948) were early explorers in the world of resistance when they concluded that “by preventing or greatly modifying group resistance to change, this concomitant to change may well be greatly reduced”. Both Lawrence (1954) and Zuboff (1982) stated that this is not simply an irrational phenomenon to be overcome (Spil, Schuring, & Katsma, 2002). Moreover there are not only negative aspects, but also positive aspects to resistance (Zuboff, 1982). Spil et al. (2002) introduced a framework of resistance of users IT. This framework makes a distinction between “micro resistance”, the degree to which the locality negatively influences the users of IT, and “macro resistance”, the degree to which IT-users themselves are opposing or postponing the IT change. The sub-dimensions of the latter type of resistance are all connected to the users’ attitude towards change.

van Offenbeek et al. (2012) defined resistance as: “behavioral reactions expressing reservation in the face of pressure exerted by change supporters seeking to alter the status quo”. Lapointe and Rivard (2005) identified five interacting resistance components in their Multilevel Model of Resistance to ISs. These are: (1) initial conditions (the context before implementation); (2) subject of resistance (the user or actor); (3)

object of resistance (the IS); (4) perceived threats (the possible negative consequences of the object for the subject); and (5) resistance behaviors. Resistance behavior may vary from apathy to aggressive resistance. They also stress that resistance behaviors can vary over time and argue that resistance results from perceived threats rather than from the system itself (van Offenbeek et al., 2012).

Resistance has proven to be a more complex phenomenon that is not always negative (Zuboff, 1982). Sometimes resistance may even be regarded as functionally useful. For example whilst deviation in a non-managerially prescribed manner is typically regarded as resistance or recalcitrance, on closer inspection, this type of behavior may also be revealed as positive or supportive and undertaken in order to overcoming the shortcomings of new technology which, for example, is genuinely unable to sustain, monitor or track actual working practices at the same time as allowing employees to work co-operatively or flexibly (Ferneley & Sobreperez, 2006). Where a mismatch occurs between the expectations of technology and actual working practice, employees may implement a 'workaround' by deviating from set procedures. This notion of workaround is defined by (Koopman & Hoffman, 2003) as: 'The alternative path that is created by people, by utilizing their knowledge and experience of an information system, to reach a blocked goal.'.

If we compare post-adoption unanticipated usage with resistance we see that the first phenomenon only occurs after the information systems is implemented, while resistance can start as soon as an IT event (e.g. the launch of a new product of an update) is announced. The global motives behind resistance are attitude (e.g. parochial self-interest, misunderstanding and lack of trust, different assessments, and low tolerance for change), subjective norms, and perceived control (Spil et al., 2002; Westaby, 2005), while unanticipated usage typically occurs when users cannot complete their tasks. Furthermore the development of appropriation does not require an IT-event; it can start when a user finds a novel way to accomplish his tasks in a more suiting manner than prescribed by his employer, while resistance arises when users spot a threat or an opportunity after an IT-event. Another difference is that resistance is a user behavior while unanticipated use refers to a possible result of this behavior, users preforming tasks in a non-prescribed manner.

3.3 CATEGORIES OF SYSTEM USE

In this paragraph different categories and taxonomies of system usage will be presented and compared with each other. Also a decision will be made about the taxonomy that will be as a basis for the case study.

We first look at the CMUA model of Elie-Dit-Cosaque and Straub (2011). Consistent with Beaudry and Pinsonneault (2005), Elie-Dit-Cosaque and Straub (2011) offer an integrative approach grounded in the theory of coping. These researchers define the adaptation process as a one-sided coping process: 'coping deals with the adaptation acts that an individual performs in response to disruptive events that occur in his/her environment'. In accordance with the Theory of Coping, they go on to assert that IT users employ two processes to cope with a disruptive IT event. The first process is an appraisal whereby individuals evaluate the importance of an event, given their own situation and interests. The second process is the process of coping. In order to cope, users attempt to manage the situation through what the authors called the 'coping effort'. Applied to IS, the CMUA approach to user adaptation can enrich the view of individual reaction to IT and go beyond the sundry limitations found in the IS acceptance and usage literature. Their general conceptual model is depicted in Table .

First appraisal	Second appraisal	Adaption strategy	Adaption effect	Users' objective
Opportunity	High control	Benefits maximizing	Problem-focused maximal efforts	Take full advantage of the opportunities of the IT. Maximize personal benefits.
	Low control	Benefits satisficing	Emotion- and problem-focused minimal efforts	Satisfice w/r/t/ opportunities offered by the system.
Threat	High control	Disturbance handling	Problem-focused	Minimize the negative consequences of the system. Restore emotional stability.
	Low control	Self-preservation	Emotion-focused	Restore emotional stability. Reduce tension arising from the It event.

Table : Four adaption strategies (Elie-Dit-Cosaque & Straub, 2011)

Ferneley and Sobreperez (2006) argue to reconsider to use classification schemes which focus on the initial rejection rationale (e.g. positive versus negative resistance) and propose a revised taxonomy that may be more appropriate, because it includes the notion of subsequent workaround activities. Their initial taxonomy is presented in Table .

Category		Explanation/Definition
Compliance		The user interacts with the system in the prescribed manner
Resistance		Opposition, challenge or disruption to processes or initiatives
	Negative resistance	The rationale is to oppose or deceive
	Positive resistance	The rationale is to support or improve
Workaround		The action ensuing from resistance
	Hindrance workaround	The workaround is undertaken to circumvent system procedures or process perceived to be too time consuming, onerous or difficult.
	Harmless workaround	The workaround does not significantly affect workflow or the accuracy of captured data
	Essential workaround	The workaround is essential in order to complete the task at hand

Table : Initial Compliance/Resistance/Workaround Categories (Ferneley & Sobreperez, 2006)

The classification of Ferneley and Sobreperez (2006) however is not comprehensive enough to classify the whole set of system usage. Also acknowledging the resistance component suggests that an IT event is necessary to form a workaround.

Type of system usage	Faithfulness to spirit	Performance outcomes
Normal usage	Faithful	Outcomes are consistent with system design and data quality is unaffected
System domination	Faithful	Outcomes are consistent with system design, but usage can be ineffective (which users may or may not perceive)
Circumvention	Unfaithful	Workarounds arise due to poor functionality or perception of this due to a lack of knowledge. Outcomes are inconsistent with system design and have negative effects on others as usage is individualized or inconsistent. Data quality is likely to be affected due to inconsistency.
User innovation	Unfaithful	Innovation occurs in response to poor functionality. Outcomes are inconsistent with the system design, but are agreed upon to meet common goals and so are seen as positive. Data quality is like to be affected due to inconsistency.

Table : Taxonomy of system usage (Wilkin & Davern, 2012)

Wilkin and Davern (2012) considered system usage in its relationship to the systems' spirit in the development of their taxonomy, in other words actual usage in relation to designed usage. AST (Desanctis & Poole, 1994) dichotomizes appropriations as being either faithful to the spirit or unfaithful to the spirit. This relates to whether or not an appropriation is consistent with and thus faithful to the objective spirit. Importantly, unfaithful appropriations are not bad per se; rather they are simply different from the

objective spirit. Moreover, faithfulness (or lack thereof) is not directly related to positive (or negative) outcomes. The Taxonomy of System Usage shown below (see Table) reveals the different combinations of usage, faithfulness to the spirit and related system performance outcomes.

In understanding the disconnections that occur between the objective spirit of a system and users' subjective conception of this, Wilkin and Davern (2012) created a three part model, namely the Presence, Perception and Usage Model.

> ***Presence*** *is concerned with whether or not a disconnect exists.*
>
> ***Perception*** *is concerned with whether or not the user perceives a disconnect to exist. Note: a disconnect may exist but go unnoticed, or alternatively a user may incorrectly perceive the exact nature of the disconnect. For example, a user might fail to appreciate the situation from a managerial level, instead focusing at an operational level.*
>
> ***Usage*** *of system functionality reflects a user's response to the perceived disconnect in a given situation.*

By classifying the four types of usage from Table in terms of the Presence-Perception-Usage Model (see Table), it is clear how disconnects are present in all types of usage other than normal usage and how these relate to output. This comprehensive taxonomy of system usage will be used to present the results of the case study in Chapter 5.2.

			Presence	Perception	Usage
Type of usage	Normal Usage		No disconnect	No disconnect perceived	Usage is consistent with objective spirit
	System domination	By inflexibility	Disconnect present	No disconnect perceived	Usage is consistent with objective spirit
		By Inaction	Disconnect present	Disconnect perceived	Usage is consistent with objective spirit
	Circumvention	By False perception	No disconnect	Disconnect perceived	Unnecessary workaround disconnect*
		By Misperception	Disconnect present	Nature of disconnect misperceived	Inappropriate or incomplete resolution of disconnect*
		By Misaction	Disconnect present	Disconnect perceived	Bad resolution of disconnect*
	User innovation	By Consent	Disconnect present	Disconnect perceived	Novel resolution of disconnect*

Table : Presence-Perception-Usage Model (Wilkin & Davern, 2012)

- ***Inflexibility*** means that system functionality is so controlled by managerial demands and/or system design that there is no perceived alternative but to use the as per objective spirit.
- ***Inaction*** means that the system or group demands dominate so much that users choose not to seek alternatives and use the system as per the objective spirit.
- ***False perception*** means that users falsely perceive a limitation with the functionality of the system and so introduce unnecessary workarounds that are inconsistent with the objective spirit.
- ***Misperception*** means that users perceive limitations with the functionality of the system but the workaround is misguided and therefore inappropriate/incomplete. The workaround is inconsistent with the objective spirit.

- ***Misaction*** means that users perceive limitations with system functionality but the workaround results in negative effects on operational and/or managerial requirements. The workaround is inconsistent with the objective spirit.
- ***Consent*** means that users at a worksite have agreed that system functionality is unsatisfactory and have implemented an alternative usage that meets the defined needs of at least some of the key users. In a sense this innovative usage becomes the 'accepted' way to perform a task.
- * Whilst usage is inconsistent with the objective spirit, at an individual level it may/may not be consistent with hat individual's subjective conception of the spirit.

3.4 CAUSES OF UNANTICIPATED USE

To answer the research question about the causes of unanticipated usage, we analyzed the articles in order to find the concepts that could case unanticipated usage. In this sub-chapter these concepts will be introduced. Finally an overview will be given about the concepts and in which articles they are mentioned.

Personal characteristics

Many of the IS acceptance models work with the definition "intention to use" (Davis, 1989; Venkatesh et al., 2003), which has a correlation with the actual usage of an IS. According to these models the intention to use a IS is moderated by personal characteristics like gender, age, experience and voluntariness of use (Venkatesh et al., 2003). Jasperson et al. (2005) created an overview of various individual differences considered by illustrative IT adoption and use research that has examined use after adoption. The most frequently used characteristics to determine if it has an impact on the user's answers on the other questions are: age, gender, education, work experience, technical experience, personality and voluntariness of use (Jasperson et al., 2005). Elie-Dit-Cosaque and Straub (2011) used four control variables, namely age, gender, work experience and the number of hours spent a week. None of these variables that could possibly affect the experiment were found to be significant for any of the strategies of adaptation. Other authors also used this information to establish non-response bias (Kim & Malhotra, 2005).

Research on gender differences indicates that men tend to be highly task-oriented, therefore, performance expectancies, which focus on task accomplishment, are likely to be especially salient to men (Venkatesh et al., 2003). Elie-Dit-Cosaque and Straub (2011) tested the influence of the variables: age, gender, work experience and the number of hours spent a week on computers, on coping strategies. This research concluded that none of these variables that could possibly affect the experiment were found to be significant for any of the strategies of adaptation.

Training

Training is an important aspect of the usage of information system. One can argue that learning (e.g. receiving some kind of training) is a category of behavior in which individuals modify themselves to adapt to the IT (Henri Barki, Titah, & Boffo, 2007). These self-modifications behaviors influence how users interact with IT (Beaudry & Pinsonneault, 2005). Training is also a part of the Task-Technology Fit model; in which training is seen as a part of the technology (computer systems and user support services) (Goodhue & Thompson, 1995). Learning can also be used to predict future IT success according to a validated multidimensional IS success instrument for enterprise systems (Petter, DeLone, & McLean, 2008).

Jasperson et al. (2005) even argue that political and learning models might better explain post-adoptive behaviors while rational task-technology fit models might better explain pre-adoption and adoption behaviors. In summary training has an influence on how users interact with the system and is possibly a good predictor of post-adoptive behavior. Not only formal training when the job starts is relevant under this concept, but also the support users (are able to) receive while using the information systems. E.g. where employees ask their questions about the system or procedures.

System Quality

Previous research has argued that low system quality is one of the reasons that people start to using an information system in unanticipated ways. Koopman and Hoffman (2003) state that getting buggy programs (low system quality) to work well enough is perhaps the most common experience of a work-around. At the individual unit of analyses, there is a strong support for the relationship between system quality and user satisfaction (Petter et al., 2008). Since we argue that if users' needs are not satisfied by the IS there they will try to find alternative paths to reach their goals, there is a need to include questions about the system quality. Measures for systems quality include ease of use, flexibility, reliability, domination, usefulness and response times (DeLone & McLean, 2003).

Task Technology

Positive performance benefits are most likely to occur when individuals recognize a match between the requirements of a work task and an application's features and subsequently alter their post-adoptive behaviors by selectively applying features to leverage the synergy offered by this fit between the task and the technology (Goodhue & Thompson, 1995). The task technology fit model can be found in Figure . Goodhue and Thompson (1995) used eight factors of TTF, namely: data quality, data locatability, authorization, compatibility, timeliness, relationship with the users, systems reliability and ease of use/training. The last two factors have a lot in common with the measures of system quality and training and are therefore not included under task technology in the interview framework, but rather in the previous parts. The factors from the TTF that are also used in the interview framework include individual performance impact and the task interdependence.

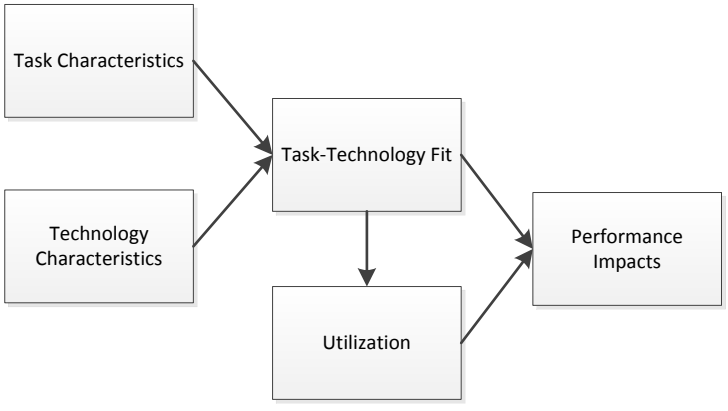

Figure : Task Technology Fit Model (Goodhue & Thompson, 1995)

The concepts behind the five factors of TTF will be explained in this paragraph. *Data quality* is a measurement on the users' satisfaction about the currency of the data, the right data and the level of detail of the data. So the need for all the necessary data at the right level(s) of details that is current enough to fulfill the employee's tasks. The measurement of *data locatability* is about the ease of determining what data is available where and what the meaning of a data element is (and for calculations what is excluded or included). *Authorization* measures if users are able to obtain the right authorization to access data necessary for the job easily. The concept c*ompatibility* is used to determine if data from two different data sources can be consolidated or compared without inconsistencies. *Performance* is about the impact of technology in individual performance of employees. Goodhue and Thompson (1995) developed *timeliness* to determine if an information system completes its regular pre-scheduled activities on time. The measurements of *IS understanding and interest* are about how well the IT department understands the business mission, its relation to corporate objectives and how seriously they take the business' problems. The last factor is *task interdependence* which is used to investigate how well the IS supports activities that span different departments.

Fuller and Dennis (2009) used the task-technology fit model to develop their own Fit-Appropriation model. They argued that team member initially appropriate a technology based on their prior understanding of IT and the task. As team member work, they recognize outcomes from their work (e.g. effectiveness, efficiency) and develop perceptions of how well the technology fits the task. These perceptions may trigger changes in the way users subsequently appropriate the technology, redefine their tasks, or produce new structures in which the technology is used. For repetitive tasks, these changes can influence subsequent outcomes and perceptions of fit. This pattern of behaviors repeat, and perceptions of fit and the appropriations continue to evolve until the team settles into a somewhat stable set of norms. Figure is a graphical representation of this model. Fuller and Dennis (2009) conclude from their results that initial fit is not that important, because through appropriation changes users optimize their work and improve their performance.

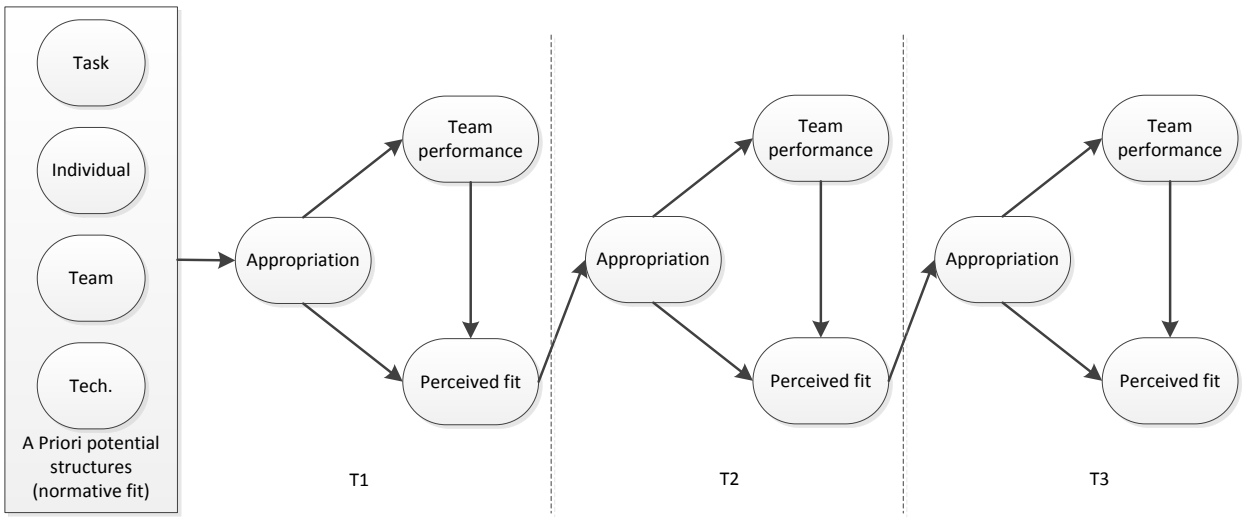

Figure : Fit-Appropriation Model (Fuller & Dennis, 2009)

IS Features

In the social construction of technology, features of a technology are interpreted (and possibly adapted) by individual users so as to constitute a technology-in-use (Desanctis & Poole, 1994). To only way to discover these unanticipated work practices is to ask users about these specific functions. This is what Jasperson et al. (2005) call the feature-centric view of technology.

In the post-adoptive context, after an individual has begun to actively learn about and use the application, awareness of the existence, nature, and potential usefulness of the application's features arise and, over time, are fleshed out. Therefore, a feature-centric view of technology is valuable because the set of IT application features recognized and used by an individual likely changes over time, and it is the specific features in use at any point in time that influence and determine work outcomes (Desanctis & Poole, 1994; Goodhue & Thompson, 1995; Jasperson et al., 2005).

Adaptation behavior

Adaptation behavior is the user's behavior directed at changing or modifying an IT and how it will be deployed and used in an organization. An underlying theme of this adaptation behavior is reinvention, which reflects the extent to which an adopter changes an innovation following its original development (Rice & Rogers, 1980). The notion of reinvention includes deliberate modification-oriented and creative activities in which users of IT engage, and is seen as an important phenomenon that needs to be considered in innovation implementations (Henri Barki et al., 2007). The three categories suggested by Rice and Rogers (1980)—i.e., technical, operation/service, and management/organizational reinvention—provide an exhaustive typology of possible adaptation behavior.

Henri Barki et al. (2007) extended this typology with the work of Beaudry and Pinsonneault (2005), so it fits the IT context:

- Technology adaptation: Behaviors that change an IT that has been implemented i.e., its hardware or software (adapting the technology).
- Operational adaptation: Behaviors that aim to change the way in which an implemented IT operates, i.e., its functionalities and interface (adapting the technology).
- Organizational adaptation: Behaviors that change an organization's business processes or the individual's tasks (adapting the work).

In summary it is possible for end users to adapt either the technology or the business processes in the post-adoption phase of an IS. The question in the interview framework about this will look at the effort (in time and energy) employees spend on recommending or suggesting improvements or modifications.

Usage of these concepts in the literature

The found concepts were personal characteristics, training, system quality, task-technology fit, IS features and adaptation behaviors. Table gives an overview of which concepts are used in the 16 main articles. We found that Task Technology fit was used implicitly in most of the articles, but was only explicitly mentioned in a few articles. The bold X's represent an explicit mentioning of the TTF model.

Article	Personal characteristics	Training	System Quality	Task-tech Fit	IS features	Adaptation Behavior
Alvarez (2008)				X		X
Azad and King (2008)				X	X	X
Azad and King (2012)				X	X	
Henri Barki et al. (2007)		X	X	**X**		X
Boudreau and Robey (2005)		X		X		X
Burton-Jones and Gallivan (2007)*	X		X	**X**	X	
Burton-Jones and Straub (2006)			X	**X**	X	
Devaraj and Kohli (2003)	X					
Elie-Dit-Cosaque and Straub (2011)	X			**X**		X
Ferneley and Sobreperez (2006)			X	X		
Fuller and Dennis (2009)				**X**		
Jasperson et al. (2005)*	X	X			X	
Kim and Malhotra (2005)	X		X			
Koopman and Hoffman (2003)*		X	X	X		
Wilkin and Davern (2012)*				X	X	
Wu and Du (2012)			X			X

Table : Causes of unanticipated usage used in the literature.

3.5 UTILIZING THE KNOWLEDGE ABOUT UNANTICIPATED

Unfortunately there is no simple resolution on how to utilize the knowledge about unanticipated usage, except to observe that evaluation of unanticipated use practices depends on the vested interests and preferences of particular stakeholders. One cannot categorically argue that unintended actions are good, any more than one can argue that they are bad (Beaudry & Pinsonneault, 2005). Based on an understanding of specific gaps, managers may decide to: (1) discontinue or redesign systems or policies, (2) embark on training or selection programs to increase the ability of users, or (3) redesign tasks to take better advantage of IT potential (Goodhue & Thompson, 1995).

Attempts that aim to rectify the situation by eliminating the workaround may bring about unintended results. That is, if the workaround is converted to more stringent rules embedded in the redesigned system, then an outcome may be the enactment of a new workaround. So a counterintuitive practical implication is that 'rationalizing' workarounds (or the so called 'rational' responses to workarounds) is likely not to produce the intended result (Azad & King, 2012). An example of this can be found in developing healthcare information systems, especially those practices designed to reduce process variation (e.g., medication ordering and dispensing systems), there is a distinct possibility of triggering computer workarounds that only lead to increased process variation (Azad & King, 2008). The literature on reinvention regards particular kinds of adaptations as necessary and desirable. However, improvised actions can also be seen as violating established business policies and endangering safety and security (Beaudry & Pinsonneault, 2005). So a company needs to carefully analyze the workarounds to determine if it is a "good" or "bad" workaround. The categorizations, presented in paragraph 3.3 can help with that.

3.5.1 User participation and unanticipated usage

Fuller and Dennis (2009) argued that as team member work, they recognize outcomes from their work (e.g. effectiveness, efficiency), develop perceptions of how well the technology fits the task and produce new structures in which the technology is used. One can therefore argue that if end users are involved in the

early stages of the system development process, the user adaptation can be prevented, because the structures are known in advance. And if the users perceive a low technology fit, adaptations can be made to the technology before it is in use. This section will explore the scientific literature about user participation and the possible consequences for system usage.

In IS literature two definitions are used around the topic of user participation, these concepts do not always have the same meaning. H. Barki and Hartwick (1989) made a distinction between these concepts and developed a definition for both. *User involvement* refers to "a subjective psychological state reflecting the importance and personal relevance of a system to the user", whereas *user participation* refers to "a set of behaviors or activities performed by the user in the system development process". This paper will focus on the latter concept.

There are different types of user participation; the distinction is made on *who* is participation *where* in the process users participate, and what the *role* of the participating users should be. Support was found that *user participation* will lead to better system quality and higher user satisfaction. Also users perceive the system as more useful (Sabherwal, Jeyaraj, & Chowa, 2006). There is however not a best practice on how to involve the users in the system development.

Chapter 4

4 Case study

In this chapter the results of the case study will be presented. Most of the information comes from the interviews, but the observations as well as the reviewed documents are also used. In order to follow the theoretical framework presented in chapter 3, this chapter will use the same headings as the interview framework.

4.1 General remarks

The KSD department was established when KPN encountered a lot of problems with the order fulfilment of their new "Internet plus Calling" products. During that time KPN employees from different departments and with different backgrounds were selected to solve these problems. All these employees had much knowledge about their area and high experience in their field, together the developed a standard way of working with the available systems.Figure 6 gives a simplified model of this situation. Users had to fulfil their tasks with the available ISs. Only little adaptations, like developing new authorisation level, were made to these available systems in order to support the new activities of the department.

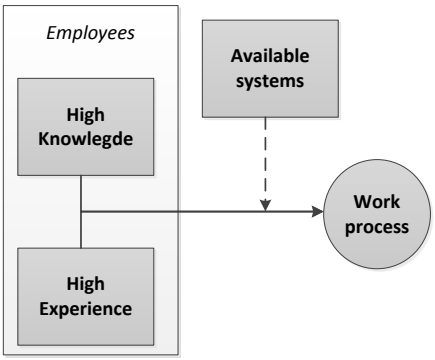

Figure : Origin of work process

4.2 Personal Information

As stated in the methodology chapter the participant were randomly selected. Therefore there is no selection bias in this sample. Table shows an overview of the personal information of the participants.

	1	2	3	4	5	6	7	8	9
Group	Expert	Regular	New	New	Regular	Regular	Regular	Expert	Expert
Gender	Male	Female	Male	Female	Male	Male	Female	Male	Male
Age	29	61	56	30	34	23	42	36	33
At KPN since	2006	1998	2009	2009	2011	Apr-12	1998	2003	1998
At KSD since	2008	2010	Oct-12	Oct-12	2011	Apr-12	2010	2010	2010
Tech. Exp.	++	+/-	+	+	+	++	+/-	++	+
Voluntariness	+	++	++	+	+	+	+/-	++	+

Table : Personal information overview

In Figure some of this data is also presented in the form of charts, in order to better understand the data correlation.

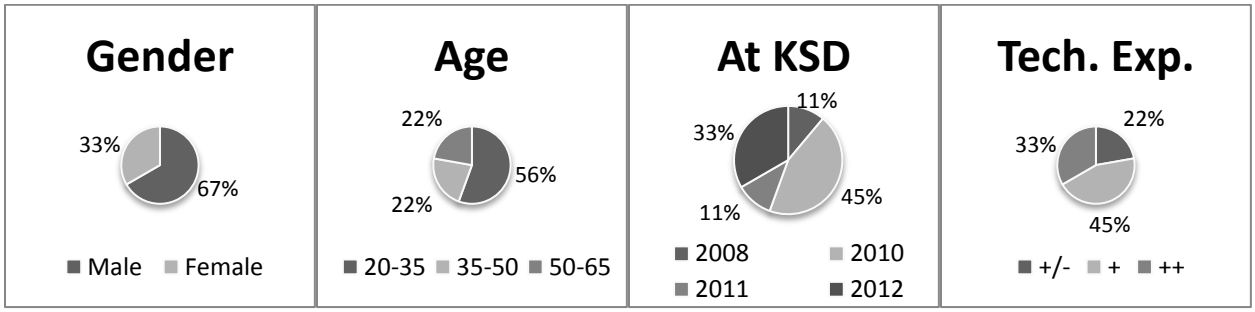

Figure : Charts about the gender, age and experience of the interviewees.

4.3 TRAINING

Since the start of the KSD in 2008 many different ways to train the agents were used. Roughly two phases can be distinguished; the time between establishing the departments and the merger with V&I (Sales and information) second line and the intake of new agents thereafter. In the beginning only employees with experience were selected for the KSD, they already had previous knowledge about the systems. In this period only a few e-learning modules were available for these agents. So basically the first few agents, with all kind of different backgrounds, developed their own work processes, based on their knowledge and previous experience (see Figure 6). These work processes enable agents to solve customers' problems, but it is still unclear if the easiest and fastest way.

After this first period the training has become more standardized, based on the developed work processes, because also users without KPN experience joined the KSD. Currently new employees receive 6 weeks of formal training (theory and practice). A big part of the training is problem based learning; fictional customer problems are presented and students have to try and solve these problems. The students also watch how experienced employees work. After the 6 weeks of training a new agent is able to do outbound work. In a later stage agents receive training for analog telephony, after this training the agents are also able to handle inbound shifts.

Since training changed a lot over time, it is not possible to say something on the quality of training in general. It is however interesting to see to whom the interviewees went with their questions about the daily use of the information systems. All but two expert users (both member of the troubleshooter group) asked their neighbor how to do something if they have a simple problem. Five people mentioned the troubleshooters in their answer. Troubleshooters are mainly used for questions about procedures e.g. what steps to follow in which order to solve a complex problem. Three interviewees mentioned the coaches and none of the interviewees inquire the IT department or Process specialists if they have a question. The agents only contact the IT department it they encounter technical malfunctions. A graphical representation of these results in percentages can be found in Figure .

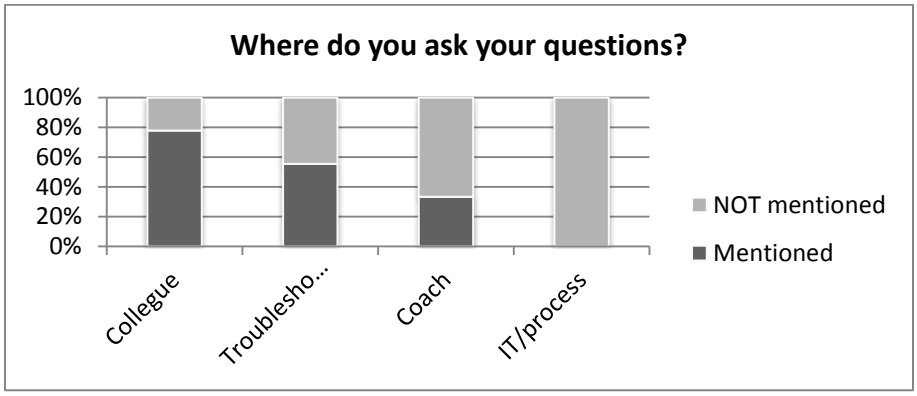

Figure : Where do you ask your questions about the daily use of the information systems.

Since training changed a lot over time, only the remarks of the employees that were trained in 2012 (3 in total) are summarized in the list below. This should provide a reprehensive overview of the current state of the training and which subjects/systems are neglected in the training.

- Protocol is not discussed in the training. So new employees do not immediately know what is expected from them when they start. Which work has higher priority? etc.
- Siebel CM, one of the newer systems, is not discussed during the training.
- Agents are not introduced to MAM during the training.
- It would be beneficially if some basic knowledge of analog telephony was included in the first training, because agents will run into these cases during their outbound shifts.

4.4 System Quality

When the interviewees were asked about the system quality they all used Siebel CM to illustrate the current problems. The performance of the CRM system is bad and the system suffers from a lot of downtime and performance issues, especially in the period after a new release. After selecting and confirming a customer, it takes a lot of time to load all the customers' information. Also after a call is finished Siebel CM is slow to set the agents' status to available, necessary to answer the next call. This is frustrating for the agents, because they want to help the customers as fast as possible. The interviewees are even more frustrated about the downtime, because they rely on Siebel CM for certain Key Performance Indicators (KPI's) on which their bonus is based. Figure contains 3 charts about how users classified the speed and the downtime during the interviews. One minus (-) represents a dissatisfied interviewee. Two minuses (--) represent an extremely dissatisfied interviewee.

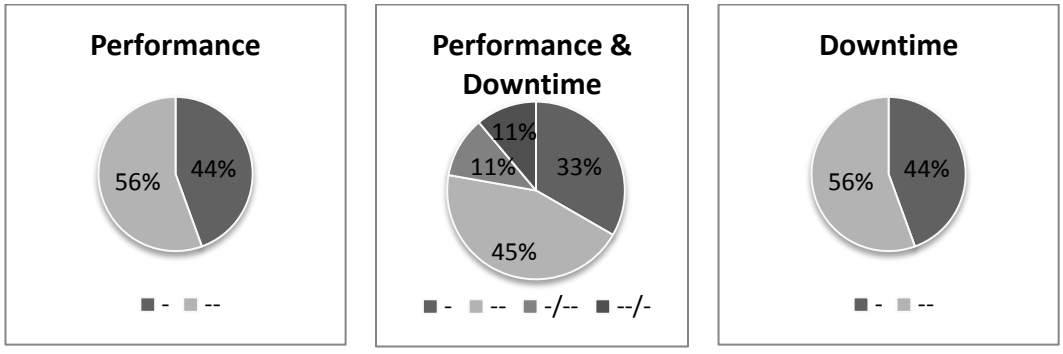

Figure : Charts about speed & downtime.

An agent has to follow a certain path through the system to analyze the customers' problem and report their productivity. The system is however not classified as dominant. Three interviewees compared the KSD' systems to the systems they had to use at the technical support desk, to illustrate how dominant that system was. They all used the same example in which a customer experiences difficulty with their modem, the modem still sends feedback to the KPN server but does not give an (wireless) output to the customer's computer. Because the script uses the feedback of the modem to conclude that there is no problem with the modem, the agent is not able to send a new modem to the customer (even if he/she is sure that that solves the problem). Agents therefore use this workaround: they ask customers to disconnect their modem, than they run the script again, and send a new modem to the customer. Fortunately the systems at the KSD put more thrust in the agents and do not force certain actions via scripts.

In general the systems were classified as useful. Not all systems are used in all cases, but currently there is not a system that could be discontinued without problems. There are however some redundancies, especially in the systems that are used to report productiveness. As you can see in Figure 10, six of the interviewees identified redundancy as a problem. Because of this redundancy, it takes a lot of time to register what is discussed with the customer.

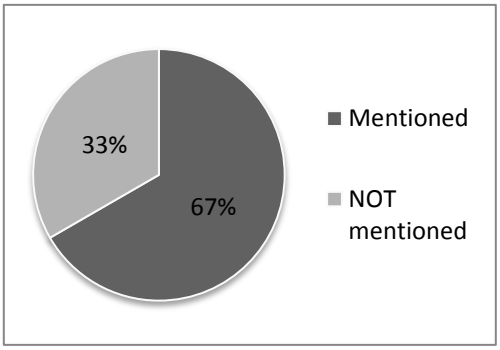

Figure : Redundancy

4.5 TASK TECHNOLOGY

The comments of the employees are graphically presented in a chart which can be found as Figure . The figure only presents remarks that were mentioned by at least two of the interviewees. The next section will describe the remarks in detail.

Data quality and locatability:
All the agents agree that they have access to the information they need to complete their tasks. The necessary information is however scattered over different systems, consequently it takes a lot of time to collect all the information from all the systems. Twenty-two percent of the interviewees were not sure if data in Siebel CM is used in the optimal way, they suggested that "customer requests" can be reused. More information about this suggestion can be found in the IS features paragraph.

Authorization:
One third of the interviewees indicate that they have many different passwords. All these passwords also expire on a different day. This forces them to write them down somewhere which, according to the agents, causes a serious security problem.

Sometimes there is not a profile that provides KSD agents with sufficient rights to perform their task. A solution would be to have two separate accounts with different authorization levels, but this is not allowed. Therefore some employees share an account or ask their colleagues to perform a certain task for them. For example both of the new employees, whom transferred from another department, still had some of their old authorizations and gratefully make use of that.

Four of the interviewees stated that they would like more authorizations in order to complete certain tasks themselves, instead of sending the request to a back office department. This way they can offer the customer a faster solution.

The KSD has a special team for frequent callers named: Multi-Disciplinary Team (MDT), this team has received more training and also has a higher authorization level; this team does have all the authorizations necessary to complete their task.

IS understanding and interest:
According to 89% of the interviewees the IT department has sufficient knowledge of the tasks they perform. New features are often based on requests made by agents. In contrast to what you would expect, if the interviewees state a high IS understanding, none of the systems were adapted to cater the specific needs of the KSD department. E.g. an agents needs to categorize a "customer requests" in categories developed for another department.

According to 67% of the interviewees the IT department takes their problems seriously. They however note that requests that take little time are included easily, but that the IT department has problems to address big new features because releases are already filled. Three agents stated that new releases cause many problems during the first week; this is very frustrating because they need the systems to complete their work.

Task interdependence:
Unfortunately not all service departments at KPN work with the same CRM system, therefore not all the information is available to the KSD agents. KPN syncs the information available in the different CRM systems, but this sync does not push real-time information. So if a KSD agent receives a call that is transferred from another desk, (s)he cannot always see what the previous employee discussed with the customer. The lack of information about incoming cases from other departments is mentioned by 67% of the interviewees.

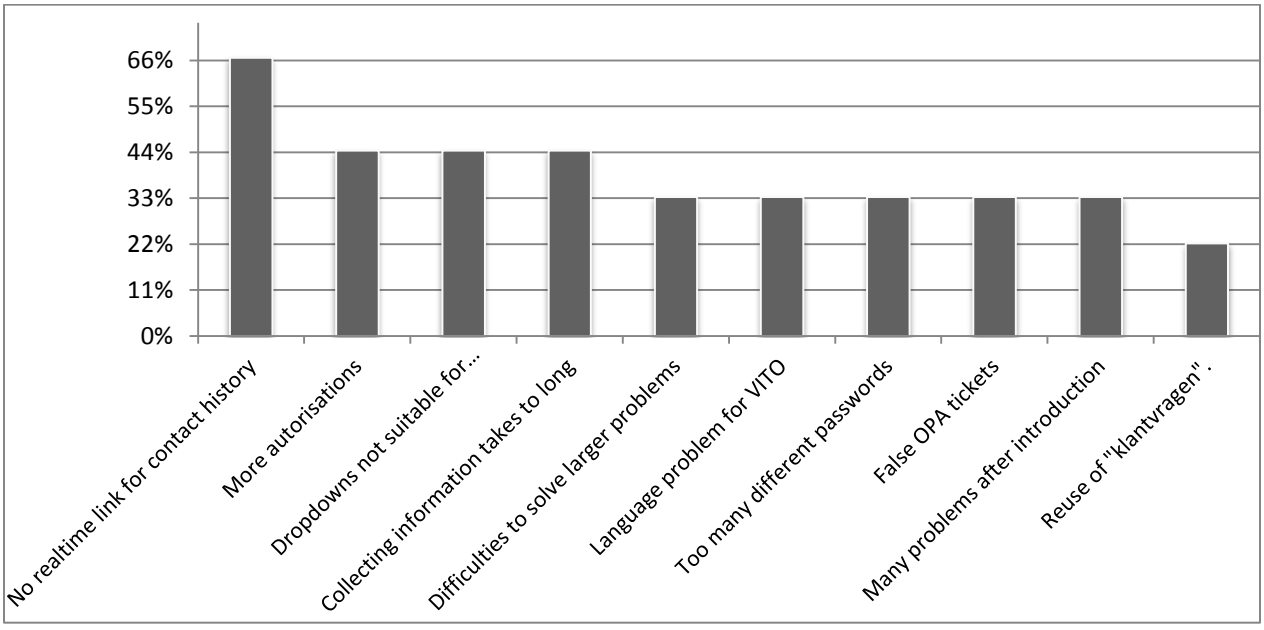

Figure : Comments on the task technology fit.

4.6 IS FEATURES

All of the interviewees use MAM to keep track of their daily productivity. From the interviews it was possible to deduct the origin of MAM. The first instance of MAM was borrowed from Digitenne (another department of KPN) to automate the distribution of KADO cases among agents. KADO did not offer an easy function for this and therefore the department built an Access tool that could import a text output of KADO. Later on the KSD needed more information to measure the productivity of agents. Since the available programs did not supply enough information to measure the most important KPI's, they decided to extend the MAM database. Recently the KSD was confronted with a lot of customer requests that should not have been forwarded to the department. Therefore a learning loop was added to MAM, in order to give an agent to possibility to supply the previous department with feedback. The goal of the learning loop is to get less unjust cases. All the functions in MAM were built to provide a solution for shortcomings in the "official" IS, building this Access database enabled the KSD to quickly solve a problem without the support of the IT department. Some downsides of MAM were noted:

- Four interviewees mentioned that MAM relies on manual input form employees and it therefore not reliable. Agents are able to report higher performance by manipulating the input. The management takes this risk for granted, because they depend on the information from MAM to manage the department.
- Seven interviewees told that MAM, because it relies on manual input of data, forced them to do more work than necessary. This is caused by the redundancy in information systems used to log calls.
- One interviewee thought it was inconvenient that it was impossible to use MAM before 08:00.

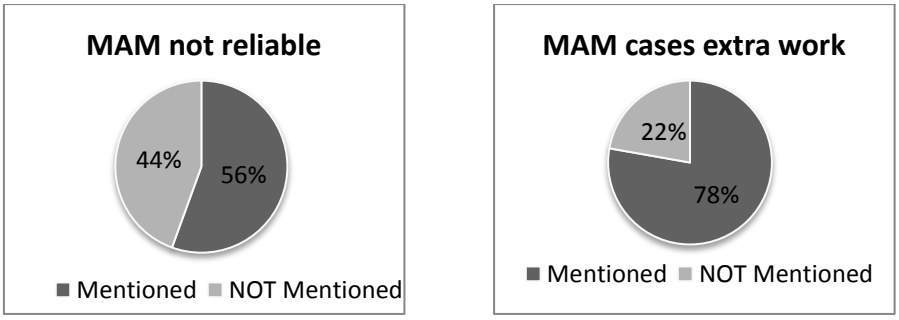

Figure : Remarks about MAM.

Keepass is an open source password manager that also offers an option to write scripts to automate certain tasks that can be completed with a keyboard. One of the KSD employees originally wrote some scripts to automate the lengthy process to make a new KADO case. Later he proposed to use this script for the whole department. The management agreed to do this, because it decreased to time to make a new KADO case significantly.

- All but one of the interviewees use Keepass on a daily bases (the one that does not use Keepass, does not use KADO).
- Six interviewees also said they used the newly buttons in MAM (that use Keepass) to quickly pass the MAM log in KADO.

During the interviews three different ways of making a log in Siebel CM were identified. A detailed workflow of the three different ways can be found in Appendix B. The first method was used by 7 interviewees, the first one was developed by one individual and he did not share it with anyone else yet. The last one is used by the whole MDT team.

- All interviewees used a dash to describe the customers question on the first screen. This way is also taught to new employees.
- Five interviewees used a method to dodge the scripts in Siebel. They start a new "customer request" fill the required fields, go back to the menu, select "customer requests" which returns an overview with recent cases, and click on the most recent case.
- Three interviewees used a build in shortcut in the script to arrive at the desired page.
- One interviewee followed the whole script.

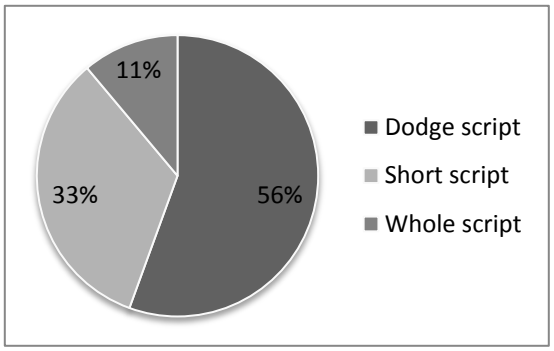

Figure : Siebel CM script usage

Chapter 5

5 ANALYSIS

In this chapter the results of the case study and the literature review will be analyzed. Paragraph 5.1 will focus on the theoretical part of this research. Section 5.2 will focus on the practical implications for KPN; recommendations to improve the current systems are made.

5.1 THEORETICAL ANALYSIS

This paragraph will focus on the theoretical part of this research. First the taxonomy of Wilkin and Davern is discussed and a refinement is proposed. Then the best approach to identify post-adoption unanticipated usage is presented. This is followed by a section on the drivers of unanticipated usage, and how this acquired knowledge can be utilized.

5.1.1 Refining categorization of unanticipated usage

While trying to use the taxonomy of system usage (Wilkin & Davern, 2012) to present the results of the case study, we concluded that there is a type of usage missing. It is a type of unanticipated usage that does not have harmful effects on the system, thus it is not circumvention. But on the other hand there is also no consent about this usage. Therefore a single user can develop a unique way of working. If the user is able to convince his colleagues and/or the management about this innovation, it can develop to an innovation by consent. We call this type of usage user innovation by individual action. If we add this new category to the Wilkin taxonomy, we get an updated taxonomy which can be found in Table .

		Presence	Perception	Usage
Normal Usage		No disconnect	No disconnect perceived	Usage is consistent with objective spirit
System domination	By inflexibility	Disconnect present	No disconnect perceived	Usage is consistent with objective spirit
	By Inaction	Disconnect present	Disconnect perceived	Usage is consistent with objective spirit
Circumvention	By False perception	No disconnect	Disconnect perceived	Unnecessary workaround disconnect*
	By Misperception	Disconnect present	Nature of disconnect misperceived	Inappropriate or incomplete resolution of disconnect*
	By Misaction	Disconnect present	Disconnect perceived	Bad resolution of disconnect*
User innovation	By Individual action	Disconnect present	Disconnect perceived	Novel resolution of disconnect without consent*
	By Consent	Disconnect present	Disconnect perceived	Novel resolution of disconnect*

Table : Updated taxonomy of system usage

The definitions of the categories in this taxonomy can be found on page 18. The definition of the new category will be:

Individual action *means that a user perceives limitations with system functionality but the workaround does not have harmful effects on the system. This type of usage can, with the proper support, grow out to user innovation by consent.*

An example of this new type of usage is the employee that decided to use his own way to make a log in Siebel. He reuses his old "customer request" by adding additional information. The employee developed this way of logging by interpreting the system and utilizing existing functions. Since this usage has no harmful effects, the necessary information is still stored; it cannot be classified as circumvention. Also there if no general consent about this usage, so by using the Wilkin taxonomy it also is not a user innovation.

This additional category for Wilkin's taxonomy of systems usage has some similarities with "*harmless workarounds*" (Ferneley & Sobreperez, 2006) that can be found in chapter 3.3. *User Innovation by individual action* is also harmless, the difference however is that Ferneley and Sobreperez (2006) do not make a differentiate on consent. *User innovation by consent* can be either a *harmless workaround* or an *essential workaround*, while *user innovation by individual action* is always a *harmless workaround*. A graphical representation of this mapping can be found in Figure .

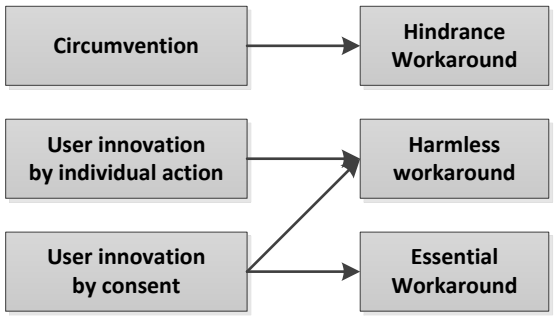

Figure : Taxonomy of system usage mapped to workaround categories

5.1.2 How to identify unanticipated usage

One of the goals of this study was to gain more insights into the concept of phenomenon unanticipated use. In order to do this, there is a need to identify unanticipated usage in practice. In order to do this, the articles from the literature research were used to examine how other researchers accomplished this. The research methods and data sources used in the articles can be found in Table .

Article	Research method	Observations	Interviews	Documents
Alvarez (2008)	***Semi-structured interviews***		***X***	
Azad and King (2008)	***Case study***	***X***	***X***	
Azad and King (2012)	***Case study***	***X***	***X***	
Henri Barki et al. (2007)	Questionnaire (Quantitative)			
Boudreau and Robey (2005)	***Case study***	***X***	***X***	***X***
Burton-Jones and Gallivan (2007)*	Literature research			
Burton-Jones and Straub (2006)	Experiment			
Devaraj and Kohli (2003)	Experiment			
Elie-Dit-Cosaque and Straub (2011)	Experiment			
Ferneley and Sobreperez (2006)	***Case study***	***X***	***X***	***X***
Fuller and Dennis (2009)	Experiment			
Jasperson et al. (2005)*	Literature research			
Kim and Malhotra (2005)	Questionnaire (Quantitative)			
Koopman and Hoffman (2003)*	Literature research			

Wilkin and Davern (2012)*	***Case study***	***X***	***X***	***X***
Wu and Du (2012)	Meta-analysis			

Table : Research methods and data sources used in previous research.

Four of the articles only used literature research as a method to explore system usage. These articles did not cover any information or examples on how to identify unanticipated usage and are therefore irrelevant in this case. Four other articles contained experiments in a controlled environment to validate hypotheses; these articles were irrelevant because this research tries to identify unanticipated usage in an uncontrolled environment. Among the eight remaining articles a distinction can be made based on the type of research, namely quantitative and qualitative research. As mentioned in Chapter 2 this research has chosen a qualitative approach in order to receive a better context and understanding of the phenomenon, thus we compare our approach with the approached in six other articles. Most of these articles used multiple sources of information, this is necessary because it is difficult to distinguish unanticipated usage from anticipated usage for a system that is already in use for some time. Desanctis and Poole (1994) stated; the spirit of a technology early on, when technology is new, put on by designers end is evident in their pronouncements (manuals or marketing). While later on the spirit is more dynamic and harder to deduct, this is also true for actual usage. In the stages just after system implementation only minor forms of unanticipated use can be distinguished. As organizations adopt the technology they contribute to the actual use practices.

Only the article of Wilkin and Davern (2012) explained how the different data sources were intertwined and connected in their research approach, the others did not. However in this research we used a different approach. Is we compare these two approaches, which can be found in Figure and Figure , we find that both use three data sources; observations, interviews and document.

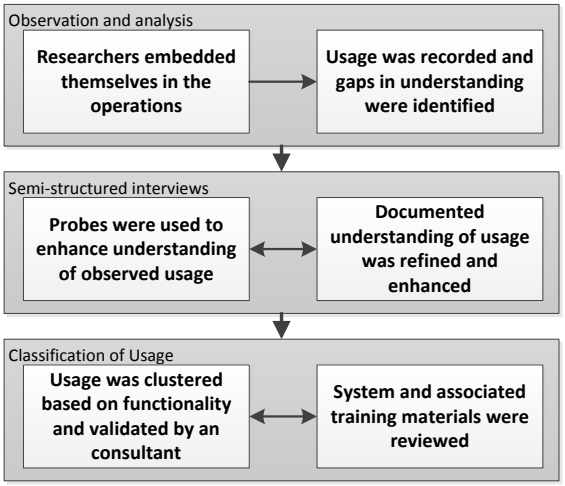

Figure : Research approach of Wilkin and Davern (2012)

The difference however is that Wilkin *et al.* started with observations while our approach starts with reading the available documents. Starting with the documents will give the researcher an overview of prescribed use, which is not necessarily intended usage if users are able to adapt these documents. Starting the observations with this knowledge will provide a quick start. Another difference is that our framework also explicitly refers to collecting data from other stakeholders like managers and process experts; this

prevents bias and will provide more information about the intended use (if documents were altered). Finally our framework also shows what subjects are included in the interview framework or not.

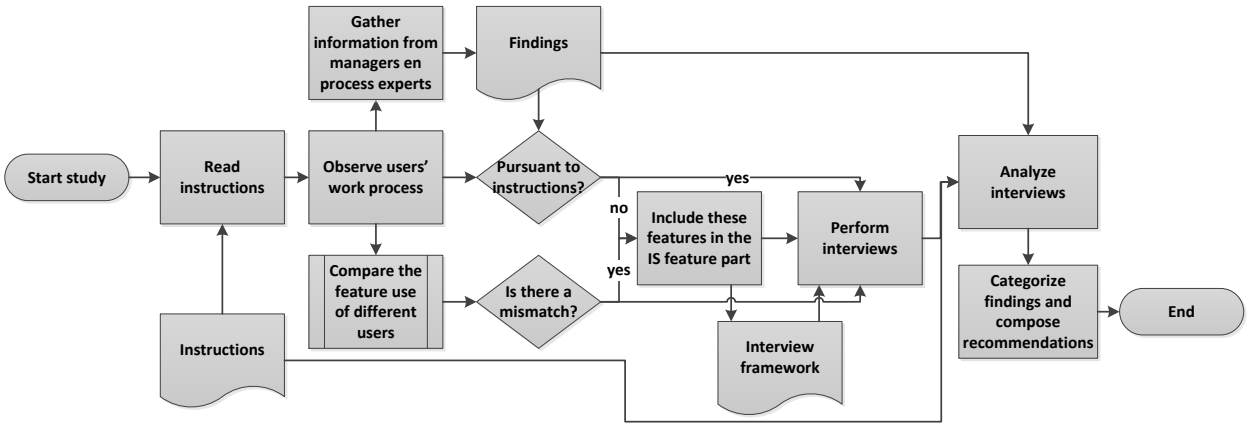

Figure : Framework to identify unanticipated usage.

We argue that collecting information with this framework proved to be efficient and effective. With less information sources some unanticipated use practices would not have been identified. Since the framework proved itself at KPN, it could also be useful in other organizations with complex information systems.

5.1.3 Drivers of unanticipated usage

Most of the literature that exists on the subject of unanticipated usage has been dominated by negative connotation associated with this type of use (Ferneley & Sobreperez, 2006). This research on the other hand shows that most user adaptations have the goal to improve the fit between the users' tasks and the information system. This section will explore the drivers of unanticipated usage and how it develops over time.

Low task technology fit

When we compare the unanticipated use practices, we found during this case study, with the possible causes of these practices, like system quality and task technology fit, we conclude that low fit is a better predictor for user adaptations than system quality. The reason for this is probably that it is more difficult for users to find alternatives if the system quality is low. For example there is no alternative solution for downtime and speed problems, both system quality characteristics, in mandatory ISs. Sure these problems will cause low user satisfaction, but users will need to deal with these problems to complete their tasks. While if there is a high system quality with a low task technology fit, like data problems, users are more likely to be able to use the available information system and programs in a different way. A great example is when end users decide to use the Microsoft office suite to collect the necessary information. For example the MAM tool, a Microsoft Access database, was developed to divide the scheduled KADO cases for a certain day over all employees, KADO itself did not offer an easy solution for this (low TTF) so users decided to build their own solution that fitted their needs with the use of exported KADO data.

To summarize we believe that in setting where information system usage is mandatory, that TTF is good predictor for unanticipated usage. The lower the TTF at the introduction of the system, the more

unanticipated usage can be expected in the future. However this does not mean that there is no need to address these problems in future updates. Low system quality, like a slow system and downtime, will results in unsatisfied end users.

Development of usage over time

Now that the main reason of unanticipated usage is discovered, we want to know how information system usage develops over time. Each situation starts with a team of individuals that have tasks that they need to complete with the use of technology. In our case study we started with a team of individuals that had high knowledge and experience of the available systems as was described in chapter 4.1. The tasks of the departments were either new or previously executed by several other departments. The technology is represented by the available systems, in our case study these systems were not altered to create a fit with the tasks of the new department. In summary, based on this context, the task technology fit was low in the beginning. This initial poor fit can however be overcome through team appropriation (Fuller & Dennis, 2009). This is exactly what happened at the KSD, in the development of MAM, which was described in chapter 4.6.

The research of Fuller and Dennis (2009) was executed in a controlled environment over a short period of time. They concluded that users of an IS with a poor-fit were more likely to implement appropriation changes over time because they developed a focus on improvement which made them more aware of the tasks, technology and the manner they used it. This awareness led to many appropriation changes throughout the course of the experiment, which subsequently helped improve performance. This research however was conducted in an uncontrolled environment over a long period of time. All users had different backgrounds and experience and many of the users have worked with the systems for several years before the research started. This research demonstrates that the conclusions of Fuller and Dennis are also true in another broader context. The left side in Figure shows the initial fit of the IS at KPN and the attributes that affected this fit. The right hand side shows the appropriation changes over times and the new perceived fit and performance. This model is based on Fuller and Dennis' research model (Figure).

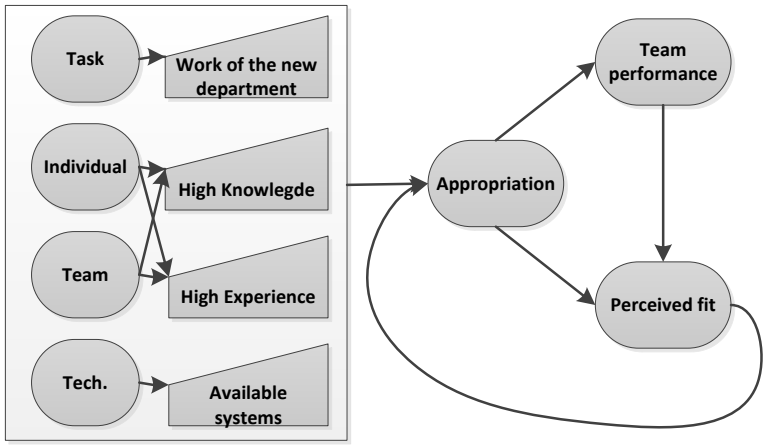

Figure : Fit and appropriation over time.

5.1.4 Utilizing the knowledge unanticipated use

Now that we understand that poor Task Technology Fit is one of the main causes of unanticipated usage at, and how usage develops over time, we need to explore how we can utilize this knowledge.

The need to improve the initial TTF

As stated before the Task Technology Fit (TTF) was poor in the beginning of the KSD; they had limited resources in the form of specifically fitted applications for the tasks of the new department. So the first employees started to work with the available technology and appropriated the way they worked with the systems to fit their need. This increased team performance quite a bit over time. Fuller and Dennis (2009) argue that the system with the best initial fit over time may not lead to better performance over a longer them, because of users' appropriation changes. We argue however that although performance increased via appropriation changes, according to the observations during the case study, production could be even higher if the initial fit was ensured in the beginning. The main reason for this is that the current system has much redundancy see paragraph 4.4. Redundancy is the result of some of the appropriation changes and cannot be solved by the end users; instead it requires action from the IT department.

Utilizing different categories of unanticipated usage

Goodhue and Thompson (1995) argued that the TTF is an excellent focus for developing a diagnostics tool for IS systems and services in a particular company. Such a system should go beyond general constructs in order to identify gaps between system capabilities and user needs. Based on an understanding of specific gaps, managers may decide to: (1) discontinue or redesign systems or policies, (2) embark on training or selection programs to increase the ability of users, or (3) redesign tasks to take better advantage of IT potential. In this research such a diagnostics tool was used, based on the adapted taxonomy we can recommend certain actions to managers.

All the categories of unanticipated usage, except for *normal usage,* need to be addressed with the three strategies from above in order to improve future systems. *System domination* causes low user satisfaction which can cause low productivity. *Circumvention by false perception* needs to be addressed in a training, users use the system in different way while there is no disconnect present. *Circumvention by misperception* and *by misaction* needs to be addressed in an IT update, because there is a disconnect present and the results of this unanticipated usage may be harmful. *User innovations* on the other hand are either harmless or this usage is *by consent*. This means that the effects of this unanticipated usage are minor. There is however a big need to address these workarounds if an organization plans to update their whole system. In that case organizations are advised to either incorporate the user innovation into the new system or make sure the innovation still works after the update.

User participation

The precious section explained that poor TTF is a driver for most of the unanticipated work practices that were found in this case study. We also learned that if the initial TTF is poor, users will appropriate the system or their work processes, which could lead to harmful behavior. Thus if the goals is to reduce the unanticipated usage of an IS, the initial TTF needs to be increased. Goodhue and Thompson (1995) argued that when users with understanding of the business task are involved in systems design, it is more likely

that the resulting system will fit the task need. This is called user participation and is already mentioned in chapter 3.5.1. The specific type user participation that Goodhue and Thompson refer to is called functionalism (Cavaye, 1995). Participation in the functionalist tradition means that involvement of users is sought in order to build functionally correct and efficient systems. Participation, then, is considered to be a means to an end: it can help provide better information on requirements, overcomes resistance, and validates design options. In summary functionalism strives to improve the task technology fit. Thus, user involvement potentially affects not only user commitment (H. Barki & Hartwick, 1989), but also (and in a completely different way) the quality or fit of the resulting system (Cavaye, 1995).

Although this research cannot prove the causal effect between user participation and better TTF, it shows that no user involvement in system design can lead to a low fit between the system and the users' tasks. Users then try to make the available system work with appropriations. Figure shows how user participation could possibly lead to less unanticipated usage.

Figure : From user participation via TTF to less unanticipated usage.

Risks

Consolidated but unanticipated usages can jeopardise the full capacity of the IT system, which most of the times evolves from the interventions of people that are fully unaware of these local and yet effective workarounds (e.g., CIOs, IT designers, developers): what develops over time and in a bottom-up manner as an "essential workaround" can become a harmful one, when the system has been changed and thus the surrounding conditions that let the former thrive (Cabitza & Simone, 2013). On the other hand, workarounds, as expressions of unanticipated and situated use, are powerful source for the meliorative change of artifacts, in terms of their "better fit" with the tasks at hand (Carroll, Kellogg, & Rosson, 1991). Reducing workarounds by increasing the standadardization can, paradoxically, cause new types of errors from misuse of such systems (Ilie, 2013) e.g. because users perceive less freedom.

5.2 Implications and recommendations for KPN

In this paragraph recommendations for KPN are made based on the results of the case study. First the unanticipated use practices are categorized in the taxonomy of system use. Secondly some general recommendation for KPN will be given based on the outcomes of the literature research and the case study. This paragraph ends with some practical recommendations to improve the Siebel CM system, which will result in reducing the redundancy.

5.2.1 Categorization of the unanticipated use practices

In this section the unanticipated use practices, which were found during the interviews, are categorized using the adapted taxonomy of system usage based on the work of Wilkin and Davern (2012) and the taxonomy of adaptation behavior of Henri Barki et al. (2007). In the last taxonomy three types of adaptations are distinguished. Since users do not have access to the hard and software itself no Technical adaptations were found. This leaves use with two types of adaptation behavior, namely operational

(adapting the technology) and organizational (adapting the work). The categorization based on both taxonomies can be found in Table .

Most of the unanticipated use at the KSD department can be categorized in the *user innovation by consent* category. The reason for this is most likely because the management of the department acknowledges the fact that the fit between the work and the system is low; therefore user innovations, with the goal to improve the fit, receive relatively easy support from the management. These innovation provide a novel resolution of the disconnect, but also are a very venerable when a system is updated. A system update that does not take these user innovations can render the innovations useless. The IT department should therefore take these innovations into account in the development of new systems or updates of the current system.

			Usage practices	Adaptation Behavior
Type of usage	Normal Usage		N/A	N/A
	System domination	By inflexibility	KANA duplicate OPA tickets	N/A
		By Inaction	Siebel CM performance problems	N/A
	Circumvention	By False perception	Avoiding the smart scripts in Siebel CM	Organizational
		By Misperception	Closing “customer requests” after each action in Siebel CM.	Organizational
		By Misaction	Using general terms to classify a case.	Organizational
	User innovation	By Individualisation	Reusing “customer requests” while performing an action.	Organizational
		By Consent	MAM	Operational
			Keepass	Operational
			Separate STAR logging	Organizational
			Trouble shooters	Organizational
			The use of dashes in the “problem” and “analysis” field in Siebel CM	Organizational

Table : Categorization of unanticipated work practices at the KSD.

Desirability of usage		Intended usage: No	Intended usage: Yes
	Good	**(1) Desired unintended usage.** • Avoiding the smart scripts in Siebel CM • MAM • Keepass • Separate STAR logging • Trouble shooters	**(2) Desired intended usage** • *Normal usage*
	Bad	**(3) Undesired unintended usage** • Closing “customer requests” after each action in Siebel CM. • Using general terms to classify a case. • The use of dashes in the “problem” and “analysis” field in Siebel CM.	**(4) Undesired intended usage** • Siebel CM performance problems • KANA duplicate OPA tickets

Table : Usage practices classified in four groups based on intention and desirability based on as-is situation.

Four groups can be distinguished if we look at the usage practices. First of all we can make a distinction between intended and unintended usage practices; the next distinction is between desirable usage and undesirable usage. The practices found at KPN are classified into these four groups in Table . The classification is based on the as-is situation, based on the available IT systems. This does however not mean that there are no improvements possible; assessing this requires analyzing the reasons for this usage. *Undesired unintended usage* is probably the category of usage that is the easiest to change. *Undesired intended usage* on the other hand requires redevelopment of processes or IT systems, thus is harder to

achieve. *Desired unintended usage* is likely to be the category for which altering the system is the hardest because

5.2.2 General recommendations for KPN

As mentioned in paragraph 5.1.4 the KPN IT department should involve the users in the development of on system. This is especially benedictional in the design phase, because in this phase users have more influence on the fit of the system. Another advantage is that by involving the users more knowledge is available about the other systems that a certain department uses. Users can point out the overlap, which was identified as a problem by 67% percent of the interviewees, of a certain function of the new or updated system with a feature in an existing system. Via user involvement KPN should be able to end up with an IT environment with less redundancy and a better fit. In the end this will reduce the time an employee needs to fulfill their "after call work" and should therefor reduce operating costs.

Another recommendation from the previous paragraphs is that the TTF should be high for standardized tasks. This should lead to higher productivity of the employees. With many departments, all with different tasks, using the same system it is not possible to design a systems that has a high fit for all of these departments. On the other hand it would be beneficial if department use the same systems, since this lowers training costs when users switch departments and will lead to lower maintenance costs, thus the IT-systems should be flexible enough to accommodate each department wishes. To accomplish this, the system should be aware which user department a user is assigned to and serve certain functions based on this information e.g. in the current situation it would be possible to serve KSD users a different dropdown menus to classify of "customer requests" than the dropdowns served to the V&I department (see Figure). Also in most cases the script can be omitted for this department. These changes will reduce the time it takes to log a call without losing information and features for other departments.

Although most of the interviewees thought that the IT-department has sufficient understanding of their tasks and takes enough interests in the reported problems and suggestions, we also found out that none of the employees directed their question of IT systems to the IT-department, concluded that there is a lot of redundancy and "self-build"-application and stumbled upon the fact that there are difficulties to solve bigger issues. This suggests that the actual IT understanding is lower than the perceived IT understanding. The IT-department should spend more time on the floor, that way they are able to identify the problems in an early stage. Now the problems presented in Chapter 4 as well as the unanticipated usage practices in Table can be used as a guide to improve the current systems. One needs to keep in mind that unanticipated usage is in some cases desirable, thus the goals should not be to reduce unanticipated usage but rather understanding what their causes are an solving the root problem (increasing the task technology fit). In the future it would be advantageous if KPN should switch to agile software development, a group of software development methods based on iterative and incremental development, where requirements and solutions evolve through collaboration between self-organizing, cross-functional teams.

5.2.3 Recommendations for Siebel CM

This paragraph will include some specific recommendations for the KPN Siebel environment that the KSD department uses at KPN to complete the after call work. A flowchart of the current situation of this process can be found in Appendix C, during this process a lot of different programs are used, there is much

redundancy due to home-build workaround tools and the process is lengthy. If KPN decides to make some changes in future updates of Siebel, it will result in a leaner process that has a better fit with the tasks at the KSD department.

Recommendations:

- It should be possible to produce facts and figures based on individual employees and teams based on the type of work. Siebel should know with team an employee belongs to.
- Also Siebel should be able to make a distinction based on the origin of the work; inbound work versus outbound work (this distinction can already made via the Aspect call information), a further distinction on outbound work also needs to be made; is it a call motive of a call a received letter, an email (from another department) or was there already a case for this customer open. This information can be collected via manual input from end users, just like the current situation in the MAM tool, or this can be based on routing information if all the cases are routed through Siebel.
- A better overview of the history of the "solution"-field in Siebel is necessary. Currently the history of all the fields is stored in the same section of Siebel, an option to filter on the new updates of the "solution"-field allows employees to read the case quicker.
- Also this option would give the first line helpdesks better information about the problem and the current status. Another pro for this function is that the employee name and the date are already registered for each update, thus there is no need for manual input of this data.
- The workflow option should be enabled in Siebel. This enables employees to schedule a "customer request" on a future a time and date. Currently this is done in the separate KADO program. Also there a new feature needs to be developed that enables employees to see the scheduled work for the colleagues in their team, this way employees are able to take on the work of an absent employee (sue to holidays or illness).
- Currently cases are sorted based on their status in the order "open", "in queue", "closed" and "in progress", changing this order to "open", "in queue", "in progress" and "closed" makes the logging method, developed by an individual employee and described in Appendix B, easier. Fewer steps are necessary for this method and will result in less after call work and an easier to read overview of all the problems a customer encountered.
- The categorization of "customer requests" based on the categories available in the STAR logging for the MSD instead of the V&I categories will provide management with more information. This will also trigger the employees to take the categorization more seriously, because the categories fit, the information is used and there is only one system were they need to fill in the categorization.
- If all the departments use Siebel, all the emails can be routed via Siebel instead of KANA, because picking up a case in Siebel will take less work that creating a new case.

All these recommendations together will result in less (too no) use of KADO, MAM and KANA. It will take less time to complete the after call work, the redundancy will be removed and it will result in a better fit, thus less unanticipated usage. The flowchart of the 'to be'-situation, can be found in Appendix D.

Chapter 6

6 Conclusion and discussion

In this final chapter conclusions will be drawn up and a discussion will be started about the limitations of the research and recommendations will be made for future research.

6.1 Conclusion

This section answers the research question which is based on the purpose statement of this study and is presented chapter 1.4. The first research question is formulated as following:

> *How can a better understanding of unanticipated usage of information systems help us to improve information systems?*

This research question was split up in five sub-questions, which are individually answered.

What is post-adoption unanticipated use?
Post-adoption unanticipated use is non-compliant user behavior that occurs after the initial implementation of an information system. This behavior is not in line with the system's spirit. This does not mean that this type of behavior is either good or "good" or "bad". It merely means that an information system is a social artifact that changes over time, organizations therefor need to keep track of the actual usage of their systems.

What categories of system usage can be distinguished?
Four main categories of system usage can be distinguished, namely: normal usage, system domination, circumvention, and user innovation. A further distinction can be mode based on presence and perception of a disconnect with the system's spirit. This research found a new type of system usage that was not discovered before, user innovation by individual action, which is novel resolution of a disconnect hat does not have any harmful side-effect but does not have (management) consent. This updated taxonomy of system usage can be found in Table . These eight different types of systems usage can be used to classify system usage. This taxonomy can be used to make a distinction between major and minor misfits with the system and things users perceive as a problem, moreover it a good starting point to develop a strategy on how to handle unanticipated usage.

How do you measure unanticipated usage?
Unanticipated usage can be discovered and measured by combining several sources of data. These sources include observations, interviews and documents. This research presented a framework for identifying unanticipated usage, which can be found in Figure . Together with the interview framework, which can be

found in Appendix A, this thesis provides other researchers and professionals with tools to find and measure unanticipated usage of information systems in other organizations.

How and why does unanticipated use occur?
Low task technology fit as a good predictor of unanticipated usage, the lower the fit the more unanticipated usage can be expected. Two main reasons for the development of unanticipated use exist; (1) users perceive a disconnect between their tasks and the systems features, and (2) if users find a novel way to accomplish their tasks in less time. In summary users want to accomplish their tasks in an efficient manner and therefore they will try to find new ways to reach their goals. Unanticipated usage is usually developed in iterations (see Figure) and is driven by end users. The tasks, team, individuals and technology have an initial (perceived) fit, through appropriations the perceived fit increases, which affects the teams' performance.

How to utilize the knowledge about unanticipated usage in system development?
Since low task technology fit is a good predictor of unanticipated usage, it is important to put more emphasis on TTF in the development of a new information system. More user participation can possibly lead to a higher task technology fit. Also the different categories of system usage, as presented in this research, can be used to develop a strategy to utilize unanticipated usage in system development and while trying to improve the current systems. Caution should be adopted in applying such a strategy too rigidly, because the positive and negative nature of unanticipated usage is inextricably bound to the obversers' perspective and judgement.

6.2 DISCUSSION

In this section suggestions will be made with regard to further research and the limitations of this research are presented.

6.2.1 Future research

As there is no empirical research on the influence of task technology fit on unanticipated usage more additional work is needed. More qualitative research should be conducted within organizations with legacy information systems, to study if these organizations encounter the same causes of unanticipated. More qualitative case studies make it possible to generalize findings to new cases. The framework to identify unanticipated usage, as presented in Figure , can be used in these cases.

The factor 'task technology fit' which was found in this study as an important factor that influences unanticipated usages is under theorized in prior literature on unanticipated usage. Although there are many articles written on TTF, adopting this concept in the field of unanticipated usage is a relatively new field. This research study confirms the importance of 'task technology fit' in this specific field. Thus there is a need to further theorize the usage of this concept in the workaround context, in order to study its precise impact on unanticipated usage. Also further exploration of the influence of user participation on TTF and unanticipated usage is recommended.

6.2.2 Limitations

Despite the fact this case study design has provided rich and detailed information about the processes within the department under study, also some limitations can be identified. The limitations are discussed with regard to the qualitative reliability, qualitative credibility and generalizability of this study.

Reliability is a weakness of qualitative research, as no standardized procedures and instruments are available it is almost impossible to repeat this study and check whether the research results are reliable. To ensure that the research results are transparent and verifiable (qualitative reliability), the research methods and procedures used during this study are carefully documented.

The data in this case study was collected by interviewing end users, observing their behavior and examining documents. The researcher interprets this information and draws up conclusions. It is impossible to separate researchers' background, e.g. education, history, prior understandings or experiences, from these interpretations. Therefore the research results are always colored and in some way subjective (H. Barki & Hartwick, 1989).

There is a chance that the interviewees were influenced by the researcher during the interview. It is possible that the interviewer's presence affected the respondents' perception of a question or the answers given. It might be possible that the end users have given, in their perception, desirable answers. This might have led to bias in the research results.

Finally the value of this qualitative case study lies in the in-depth information, description and understanding of unanticipated usage in a specific research context. A limitation is that these findings cannot be easily generalized to other individuals departments or companies outsides this study. Generalization usually requires multiple cases studies in different context, that way the researcher is able to test and adapt the findings (Yin, 2009).

Chapter 7

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Appendices

8 APPENDICES

8.1 APPENDIX A: INTERVIEW QUESTIONS

Before interview

- Explain objective
- For the purpose of my master thesis, this interview will be recorded.
- This interview will approximately take 60 minutes

Objective

The objective of this interview is to analyze and understand how agents currently use the available information system, identify adaptations and explore why and how these were developed.

Questions

1. Personal information and experience

	Kunt u wat over uzelf vertellen?	
1.1	Wat is uw leeftijd?	Age
1.2	Welke opleiding heeft u genoten?	Education
1.3	Hoe lang werkt u al bij KPN en in het specifiek bij deze afdeling?	Work exp.
1.4	Welke ervaring heeft u met het gebruik van ICT middelen?	Tech. exp.
1.5	Hoe staat u tegenover ICT gebruik in het algemeen?	Personality
1.6	In hoeverre staat het u vrij om de system te gebruiken?	Voluntariness

Based on the individual difference categories by Jasperson et al. (2005)

2. Training

	Hoe heeft u de training over de IT systemen ervaren? **Als u een vraag heeft over een van de IT system waar kunt u dan terecht?**
2.1	Kunt u beschrijven welke vorm van training u gehad heeft?
2.2	Waren er in de training bepaalde onderdelen onderbelicht?
2.3	Hoeveel contact heeft u gehad met collega's om het systeem te begrijpen?
2.4	Hoeveel contact heeft u gehad met IT specialisten om het systeem te begrijpen?
2.5	Bij wie kunt u terecht bij vragen over het dagelijkse gebruik?
2.6	Hoeveel tijd en energie heeft het gekost om het werken met het systeem onder de knie te krijgen?

3. System quality

	Wat is uw mening over de systeem kwaliteit? Voldoet het aan uw eisen?	
3.1	Zijn de systemen gemakkelijk te gebruiken?	Ease of use
3.2	Bieden de systemen volgens u voldoende flexibiliteit?	Flexibility
3.3	In hoeverre zijn de systemen te classificeren als betrouwbaar?	Reliability
3.4	Ervaart u een belemmering om de systemen op een bepaalde werkwijze te gebruiken?	Domination
3.5	Ervaart u het gebruik van de verschillende systemen als nuttig?	Usefulness

3.6	Heeft u op- of aanmerkingen op de snelheid van de systemen?	Response time

Based on the "system quality characteristics" by DeLone and McLean (2003)

4. Task technology

	In hoeverre voldoet het systeem aan uw informatie eisen om uw werkzaamheden uit te voeren? Hoe ervaart u de aansluiting van het systeem met uw werkzaamheden?	
4.1	Geeft het systeem recente informatie, is de juiste informatie beschikbaar en heeft de informatie voldoende details voor uw werkzaamheden?	Data quality
4.2	Is het gemakkelijk om de juiste informatie over een bepaald onderwerp te vinden?	Locatability
4.3	Heeft u voldoende autorisaties tot nuttige informatie die voor uw werkzaamheden van belang zijn?	Authorization
4.4	Komt het voor dat in twee systemen bij vergelijkbare velden tegenstijdige informatie vindt?	Compatibility
4.5	In welke mate zijn informatie systemen zijn belangrijk en waardevol voor uw prestaties?	Performance
4.6	Worden reguliere handelingen (rapportages etc) door het systeem volgens planning afgerond?	Timeliness
4.7	Snapt de IT afdeling uw dagelijkse werkzaamheden genoeg?	IS understanding
4.8	Worden de problemen waar u tegenaan loopt in de systemen serieus genomen door de IT afdeling?	IS interest
4.9	Hoe is de aansluiting van het systeem als het gaat over werkzaamheden die afhandeling zijn van meerdere afdelingen?	Task inter-dependence

Based on the "task technology fit model" by Goodhue and Thompson (1995)

5. Adaptation behavior

	Heeft u voorbeelden van optimalisaties van zowel het systeem als de manier van werken die vanuit de afdeling zijn gekomen?
5.1	Heeft u op eigen initiatief het systeem onderzocht, om het zo optimaal mogelijk te gebruiken?
5.2	Hoeveel tijd en energie heef u gestoken om uw taken aan te laten sluiten bij het systeem?
5.3	Hoeveel tijd en energie is er volgens u door collega's gestoken om de harmonie tussen uw takenpakket en de IT system te vergroten?
5.4	Hoeveel tijd en energie heef u gestoken in het aanbevelen van verbeteringen voor system functionaliteiten?
5.5	Hoeveel tijd en energie heef u gestoken in het aanbevelen van verbeteringen voor de interface van het systeem?

Based on the "ISURA questionnaire" by Henri Barki et al. (2007)

6. IS Features

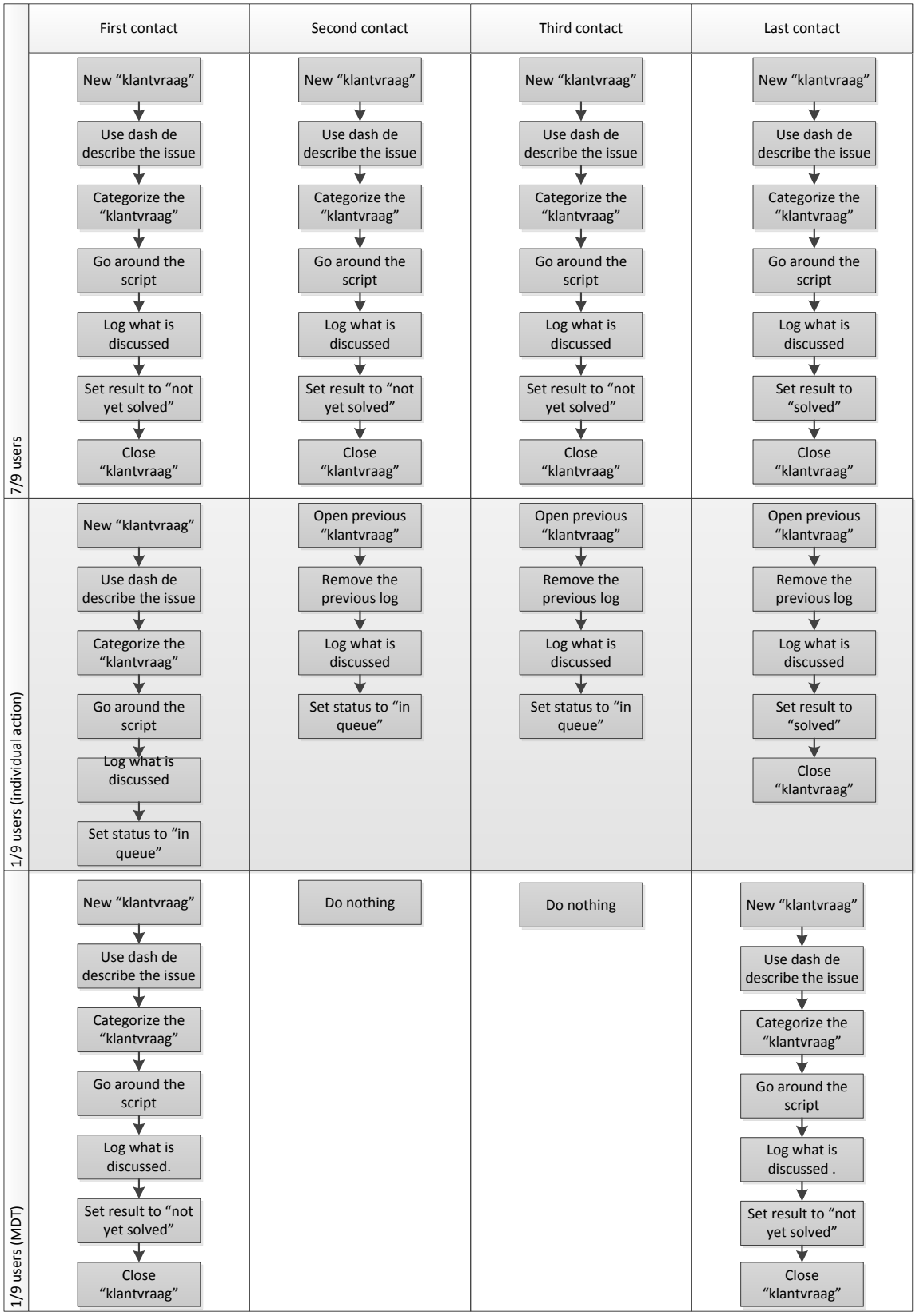
These questions are asked about a few selected function that were identified as "having variations in use" or "recently introduced" during the direct observation phase of the case study.

6.1	Hoe vaak gebruikt u deze functie van het systeem?
6.2	Zou u kunnen uitleggen hoe u deze functie precies gebruikt?
6.3	Welke wijzigingen zijn er geweest in het gebruik van deze functie sinds u op deze afdeling werkt?
6.4	Hoe verwacht u dat het systeem gebruikt zou moeten worden?
6.5	Heeft u een verklaring voor het mogelijke verschil tussen hoe u het systeem gebruikt en hoe het systeem naar u idee gebruikt zou moet worden?

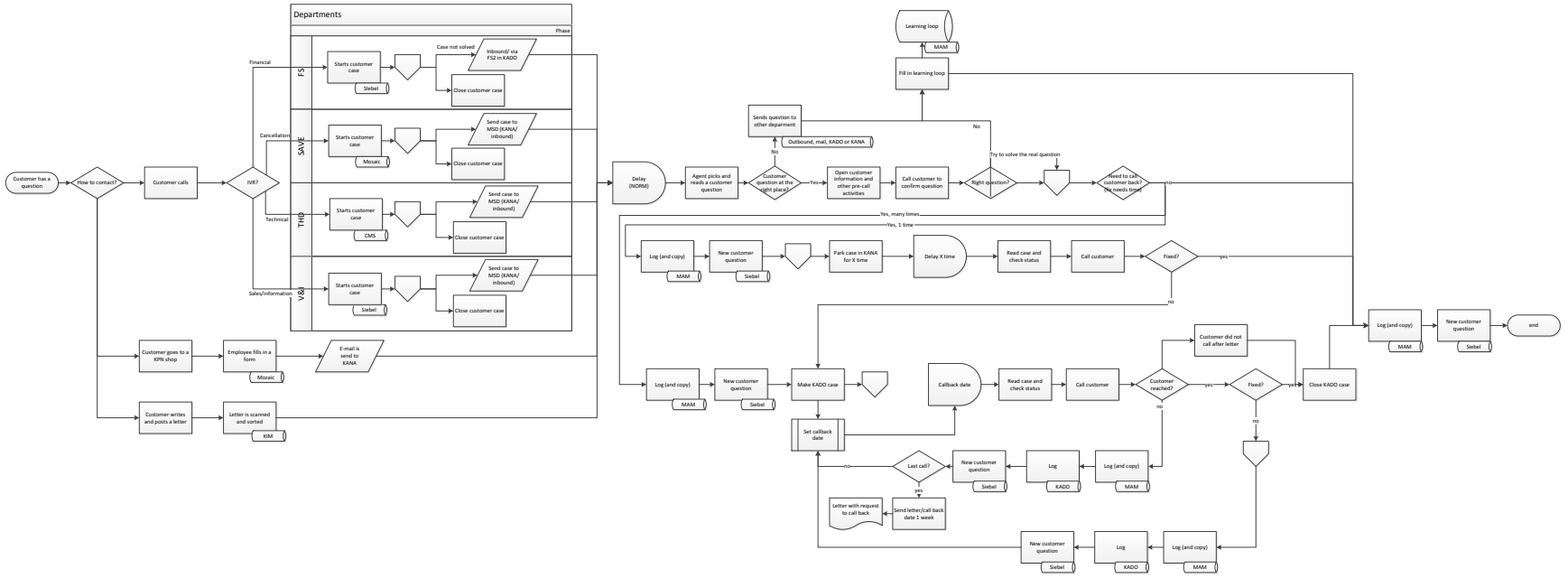
The interview ended with this question:

6.6	Samengevat als u iets aan de systemen zou mogen aanpassen, wat zou dat dan zijn?

8.2 APPENDIX B: MAKING A LOG IN SIEBEL



8.3 APPENDIX C: FLOWCHART: AFTER CALL WORK – AS IS



8.4 APPENDIX D: FLOWCHART: AFTER CALL WORK – TO BE