MASTER'S THESIS

"HOW TO INCREASE THE EFFECTIVENESS OF E-MAIL COMMUNICATION WITHIN ORGANIZATIONS"

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ABSTRACT

Although there is a great amount of theory available about structuring organizations, there still is obscurity in the way to structure internal communication. Due to the increasing application of information technology, employees are using more modern communication method; e-mail in particular. The easiness and low costs of e-mail causes, in most companies, this to be one of the main communication methods. Employees in an organization are sending each other e-mails which often contains one or more requests towards the receiver. A new problem arises: "the absence, the low quality, incompleteness, or long duration of a response on a request sent by e-mail", this will from now on be called "the phenomenon". The goal of this thesis is to develop a way to quantitative measure this phenomenon and to find out why this phenomenon exactly exists, this in order to build groundings for a solution which can replace or improve this current method of communicating. This method of measuring the phenomenon is tested at the Dutch establishment of Mansystems BV and proofed to be a valid way of performing this type of research, although this test produced also points of improvements for this method for further research. After conducting the quantitative research, the data is enriched with qualitative interview data to further explore this phenomenon, its causes, and its effects. All data in this research will describe one single case, which is the Dutch establishment of Mansystems BV. The quantitative data showed a low occurrence of this phenomenon. Proceeding interview data extended this data with possible relations. Three cases of the quantitative results with highly measureable data were subjects of the interviews. The combination of existing research, the quantitative data, and interviews gave new insights in the understanding of this phenomenon.

PREFACE

This research was initiated by Mansystems BV in Barneveld. This company builds and maintains software that supports service management processes for middle-size and large organizations e.g. KPN, Ziggo, Rijkswaterstraat. The solutions of Mansystems are built on Remedy ARS of BMC Software. The architecture of their solutions is completely according to the ITIL service management processes. The core essence of this software is to cope with requests that are initiated inside and outside organizations.

This underpins the logical relation between this research and the company's core business. Even in highly automated organizations, there is always communication between employees that flows outside pre-described information routes that are embedded into the architecture of service management tools. Mansystems does of course not believe that this out of pre-described workflows should be eliminated, but believes a software tool could facilitate these information flows more effective in a way the freedom stays with the employees. This has already been made possible with the introduction of e-mail. But what if e-mail lacks elements that can be reduced by an alternative software solution? If e-mail lacks elements, which this research should discover, it can provide groundings for a profitable new business since e-mail is one of the major asynchronous communication methods in a lot of organizations.

For me it was quite an assignment to startup this research because, although there is a lot of research been done in the sense of e-mail communication in organizations, there are not many methods of testing this in a this case. Furthermore, before testing it, how can I conceptualize e-mail communication in a way that the lack of effectiveness could be measured? It took a lot of time before I could decide that the best way of measuring this conceptual model was to build an automated quantitative research that gave e-mail users the opportunity to analyze their own e-mail behavior by answering multiple questions about every single e-mail message they receive of their colleagues out of a specific time-span. This was, according to all the literature I found, never been done using a specially programmed research-tool. One research, that came as closest to this one, used a time-consuming inbox walkthrough in which the researcher and the subject manually inspected the user's e-mail behavior. This automated way provided lots of data in a short amount of time, and more important, the repeatability of this research makes possible to test the effectiveness a possible future solution (whether it is a software solution or a change in the organization's policy). The research has provided indeed a lot of data but, good for Mansystems, did not show severe lack of effectiveness of e-mail communication in this case. Proceeding interview data further explored this subject and explained the quantitative data in order to increase the completeness of the conclusion.

I would like to thank Dr Chintan Amrit as being my main supervisor during the period of building this Master's Thesis. His support was essential for me to keep focused on the most important elements to contribute to science. I also want to thank Dr Sjoerd de Vries for being the second supervisor. His contribution was very helpful to build this Master's Thesis. Sjoerd helped me a lot with the methodological elements of science and not to get lost in all different methods and theories.

Of course this research was not possible without the assigner Hans van Donge MSc MBA. Hans provided a lot of possible directions where e-mail may lack effectiveness. This knowledge jump-started this research in a way that conceptualizing e-mail and finding literature was easier. I used his thoughts about who is responsible for responding on requests that are sent by e-mail for the interviews that preceded the automated quantitative research. These interviews proofed these thoughts that the lack of feeling of responsibility for responding on a received request seriously varied based on several causes.

The employees of Mansystems were of essential value for the input of this research. Their attendance gave an unexpected high amount of data which caused the conclusion of this research to be highly generalizable towards this organization. Due to privacy issues I cannot mention the names of the interviewees but their attendance was of create value of the exploration of the concepts, the interviewees took a lot of time to explain all elements of how they experience e-mail communication.

INTRODUCTION

In this master thesis a literature review and an empirical research is conducted in order to further conceptualize the phenomenon.

The problem is allocated in the field of responsiveness behavior of units in an organization towards e-mail communication. These units are not aware whether they are responsible for ongoing communication processes or not. The problem is that there are shortcomings associated with the transparency in responsibilities for communication through e-mail. E-mail is one of the latest communication methods; it is easy to use, low-cost, quick, and can contain all kinds of attachments, which can easily be sent to multiple recipients. An organizational design describes the organizational structure, processes and information flows, but lacks flexibility to fit in the cognitive complexity of the units inside the organization. E-mail provides opportunities for exploring informal networks and information-flow content.

This thesis will explore the problem using existing literature and a research. A research design will be explained of an automated research method of e-mail communication. This research is executed and the subsequent quantitative data will be extended with qualitative interview data.

This thesis is focused on understanding the responsiveness behavior of e-mail users.

CONTENTS

1 PROBLEM DESCRIPTION

1.1 PROBLEM CONTENT

The main objective of this research is to find a way:

"How to increase the effectiveness of e-mail communication within organizations"

The problem is that:

"There are shortcomings associated with the transparency in responsibilities for communication through e-mail"

Everybody in an organization using e-mail is a problem owner. The shortcomings in the transparency of responsibility can occur when someone in the organization receives an e-mail in which a request is enclosed. Because lack of awareness of responsibility the receiver's action upon the request might be late, insufficient, or absent. There are situations in which this lack of action in response upon a request can cause severe problems for the continuity of organizational processes.

Nevertheless, does this phenomenon really exist? If so, what are the consequences? Does it happen everywhere, or just in some organizations or some professions? The new research question then is:

"How to measure the existence of phenomenon in a specific setting and how to find out why it exists"

1.2 APPROACH TO SOLVE

To decrease this phenomenon, the way people in an organization use e-mail have to be changed. There are multiple ways of changing this of course; e.g., you can create a pre-described process to describe how people have to act upon requests that are sent by e-mail, or you can build software that can improve or replace e-mail clients, in which you can delegate responsibilities. The first question therefore is:

"What would be the most effective way of decreasing the phenomenon?"

Before finding a solution the problem need to be further explored using existing literature and own research. The literature will help to build a conceptual model that underpins the following research. After the research the following question will be answered:

"How often does the phenomenon occur? Why does this happen?"

2 CONCEPTUAL MODEL

The conceptual model is the first stage of the exploration of the phenomena of e-mail communication. This conceptual model will be based on the preliminary described problem description followed by the literature review.

The digitalization of communication is globally taking place in a massive way; therefore, a lot of literature is available. The literature review should answer the initial questions for a great part, more specified questions should arise which could be answered by the then following research. To maintain overall transparency this review is split up into multiple parts. The first part is about the content and handling of information flows, these paragraphs explain how the communication flows fit into daily operations. The information intensity describes how the number of information flows, or its size, can influence other factors. The next paragraphs explain how these information flows fit in organizations, who is communicating to whom, how these information routes can be explained, and how current software is supporting e-mail communication (e-mail client). The theories are summarized in a concept map. The elementary base of the conceptual model will cover four elements of e-mail communication.

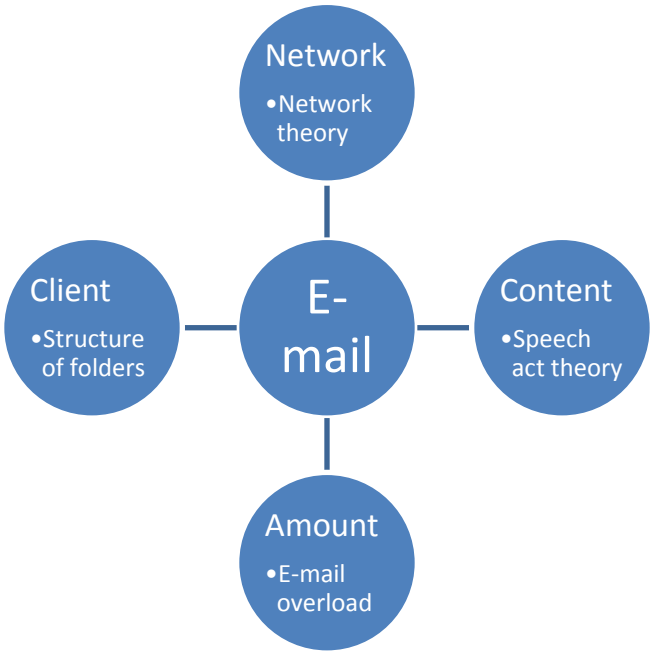

FIGURE 1 CONCEPTUALIZATION OF E-MAIL

Two attempts to improve e-mail communication are explained. At last, the extent to which the theories answer the research questions is explained.

2.1 CONTENT AND HANDLING OF INFORMATION FLOWS

Requests that are sent by e-mail are probably unplanned; they are probably not integrated in a pre-designed workflow. A paper from 1997 defines a better description of these unplanned communications. That paper introduced ad-hoc workflows in order to add flexibility to traditional workflows; these ad-hoc workflows are not pre-described but designed by the initiator of a process that is needed in for the continuity of the pre-described traditional workflow(Voorhoeve and van der Aalst 1997). Therefore, the process of an unplanned information flow is better defined as an ad-hoc workflow. These ad-hoc workflows can be executed more structured; the paper of Voorhoeve and van der Aalst suggested that an ad-hoc workflow is based on process templates. Using their method the probability of leaving an ad-hoc workflow unfinished is reduced. An e-mail is always an ad-hoc workflow. These less structured processes are supported by groupware, an e-mail client can be categorized as groupware. The task and its priority order are not fixed; this flexibility makes it hard to support and control the ongoing work (Voorhoeve and van der Aalst 1997).

Like mentioned before, this research is limited to e-mail communication supporting ad-hoc workflow information flows. An e-mail that initiate a ad-hoc workflow contains a "speech act", the speech act theory is published by J. L. Austin in 1962; this theory is based on the question: how to do things with words. A speech act can be information, a question, a request, a warning, a promise, or a challenge. Based on this knowledge it should be possible to design a process for every type of speech act. One article suggests that a special designed e-mail system can autonomously find out what the e-mail contains so the system can initiate a specific workflow(Scerri, Handschuh et al. 2008); this will be discussed later.

In an ideal world a "speech act", like a sent e-mail, is followed by an immediate response action; of course this is not always the case. The lack of response, e.g. late response, no response, or a bad quality response, is the main issue of the obscurities associated with e-mail communication. Another problem of e-mail is the use of e-mail for purposes where it's not designed for, this is called "E-mail overload"(Whittaker and Sidner 1996); this paper describes situation in which e-mail users are using their mailboxes for i.e. task management or personal archiving. This is a problem because the inbox can lose its overview, which may be a cause for the previous mentioned lack of response. In the study (Whittaker and Sidner 1996) there are three major distinguished e-mail functions:

- task management,
- personal archiving,
- asynchronous communication.

A research of these authors should give a better view on how e-mail users use their mailbox for task management, to what extend problems occur with the use of e-mail for personal archiving or filing, and about the characteristics of asynchronous communication and its way how it's conducted. The participants were generally enthusiastic about the functionality of e-mail, though some participants argue that they experience major difficulties in reading and replying in a timely manner; they have problems organizing their messages.

According to the qualitative research of(Whittaker and Sidner 1996), they found several reasons why some mails were not answered immediately. Some messages were described as “to-dos”; these messages require the receiver to perform action and the message remain in their inbox as reminder. In some cases, users received “to-reads”, these mails contain a large amount of text which is mostly not read on the moment a user received that mail. Another possibility is that a message has an indeterminate status; in that case, the receiver cannot see whether an e-mail has high priority or not in one instance. These mails were often filed for later reconsideration. At last, the mailbox is sometimes used for ongoing, but incomplete, asynchronous conversations; when one person is asked a complex question, he probably is not able to answer immediate; in this case, the whole conversation is jammed because everyone is waiting for that single answer.

A study about embedded personal information management(Ducheneaut and Bellotti 2001) the authors argued the difficulties emerged with the increasing usage of e-mail. They consider e-mail as becoming more like a habitat than an application. They investigated the unanticipated use of e-mail and proposed a potential design idea to solve that problem. A preliminary research among 60 individuals showed that many people use e-mail throughout the day, that it is the major non-face-to-face communication method, that it is also used for purposes e-mail was not designed for, and that e-mail is overloaded. Knowing this, they designed a research among 28 individuals over three different companies. The sample was receiving a minimal of three to a maximum of 100 e-mails per day with a mean of 42. 72 Persons sends themselves mails as reminder and 83 percent leaves messages in their inboxes as reminder. This paper was published in 2001; the sample might not represent the current situation due to further developments in personal information management tools (PIMs).

Communication through e-mail doesn’t only occur using the text field; employees in an organization sometimes communicate through attached files like spreadsheets. In the research of Ducheneaut and Belotti, they found that the words: e-mail and file transfer protocol were misused interchangeably. Ducheneaut and Belotti found that there is a strong correlation between the role of an employee and a combination of the use of e-mail to distribute agendas and the documentation of their activity. The authors leave one question unanswered: Would it be possible to design an e-mail client where the interface and functionality can vary based on the role of the user?

Other explorative research have showed that e-mail users have a responsiveness image of the one they communicate with; this causes e-mail users to choose a person to ask something based on his previous responsiveness behavior (Tyler and Tang 2003).

2.2 INFORMATION FLOW INTENSITY

Much available literature sees e-mail overload as one of the major causes of the problems associated with e-mail, though some authors cannot even agree about the definition of e-mail overload. Like previously mentioned the definition in the article (Whittaker and Sidner 1996) of “e-mail overload” is the use of e-mail for functions where it’s not designed for, in (Dabbish and Kraut 2006) it is defined as sending and receiving

that much e-mail that it's out of control. The last mentioned definition of e-mail overload will be maintained in this thesis since PIMs are developed and used better nowadays. The article of Dabbish & Kraut is useful; they investigate the relation between the e-mail use and the e-mail overload and its moderator. When there is a moderator which could decrease the effect of e-mail overload, this moderator could be part of the solution of the problem proposed by Mansystems. The extent in which someone receives e-mail depends on many factors. Dabbish & Kraut used in their research the interdependence, autonomy and task variety as influence on the volume of sending and receiving e-mail. The proposed moderators on the relation between the volume of sending and receiving e-mail and the feelings of e-mail overload are called e-mail management tactics, these tactics are: 1. Check e-mail after an acoustic or optic signal, 2. Restrict yourself to check e-mail on specific times, 3. Try to keep the inbox small, 4. Keep messages as reminder for tasks, 5. Leave read messages in the inbox, 6. Delete work-related messages after reading them, 7. Manually file messages as soon they come in, 8. File messages in separate folders. In their research, they selected a sample all across the United States of 484 individuals. 26% of the sample was in managerial occupation. The average amount of e-mail they receive was 42 messages every day; they read only 32 of them and sent 21 messages per day. The average of items in their inboxes was 311 messages, only 10% kept more than 600 items. The higher the interdependency and task variety, the higher the importance of e-mail to an individual's work. Based on the empirical study the researchers concluded that generally staying aware of important incoming information is better than to check for incoming messages at some moments. The more information a person receives the more a person needs to check the inbox. The method of inbox checking is important; when a person checks the mailbox at fixed times instead of all the time, the feeling of e-mail overload is reduced. Keeping the number of folders low and keeping the inbox clear also reduces the feeling of e-mail overload. The last conclusion is probably the most important one, considering the focus of this research, if workers could control e-mail overload by having e-mail software designed for managing e-mail easier, the coordination would improve.

2.3 INFORMATION CHANNELS

Now the content and amount of e-mail is conceptualized, the directions of e-mail messages can also have influence on the phenomenon of e-mail responsiveness behavior. Who sends messages to whom and in which amount? Knowing the routes of these information flows can provide valuable information about the social network of an organization(Tyler, Wilkinson et al. 2004). E-mail information flows can be an important indicator of collaboration and knowledge exchange(Whittaker and Sidner 1996). E-mail is digitally stored and therefore easy to access for research. Communities were often the subject of research; many researchers were interested in the structure of communication patterns within organizations.

The importance of this part of the paper is that the function of the sender of a e-mail can be a reason for the inadequate processing of that e-mail; e.g. an e-mail from a manager is more likely to be responded properly to then a message from someone on the same level in an organization or a on different department or someone outside the organization. The paper (Tyler, Wilkinson, & Huberman, 2004) presented a method of research for indentifying communities within organizations fully automated. This method uses large e-mail log-files and only uses the To and From field of each message. This method saves a lot of time since it is not necessary to perform a survey or other time-consuming research methods, besides, because the sample is as large as the population, lack of validity is almost impossible. To visualize the results, it is most effective to build a graph. This graph contains vertices and edges, in which the vertices represent the people and the edges the communication channels. With this method, you can calculate the betweenness centrality, the number of edges between two vertices (Freeman 1979). This is useful when measuring how people relate in a community. In figure 3 an example is given, this is also the smallest possibility of the connection of two communities. To use this method it is important not to use all the e-mail communications, for example you can exclude messages sent to more than 10 people at once, or exclude not-bidirectional communication flows, this to give a better impression about the social behavior in community. Tyler et al. found out within a study of the HP labs mail server (185,773 messages) that organizational hierarchy is somewhat visible in the e-mail network. Evaluating results from these graphs can give information about actual leadership; this was with previous methods hard to discover. Though

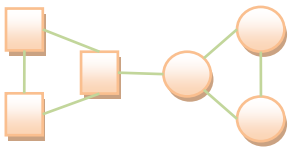

FIGURE 3 THE SMALLEST POSSIBLE GRAPH OF TWO

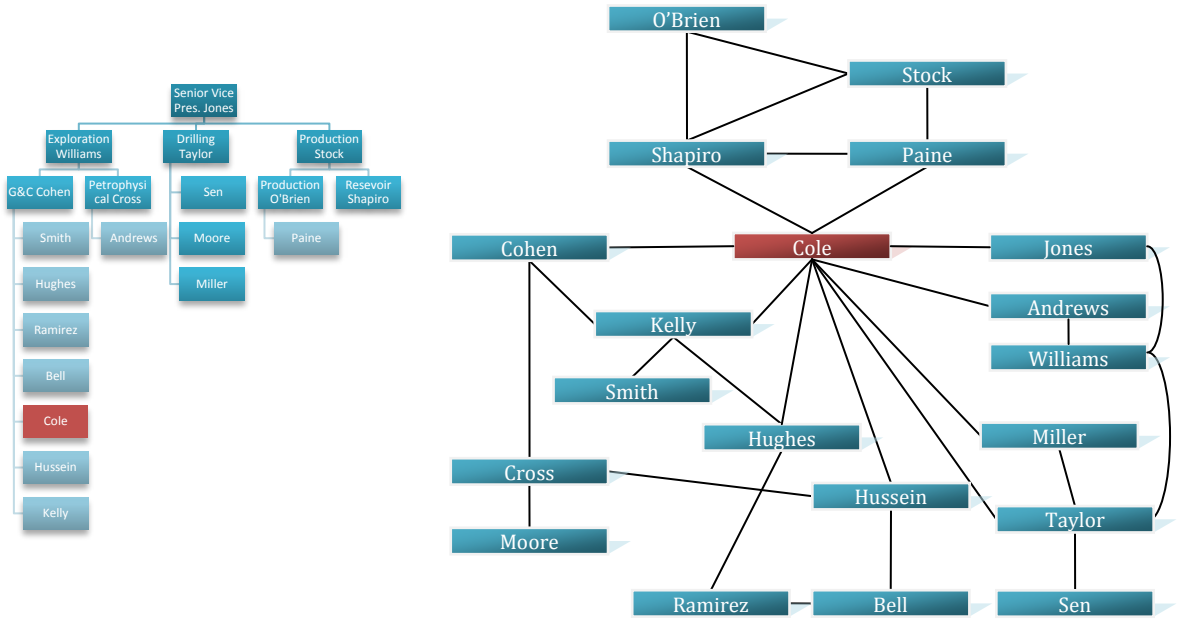

FIGURE 2 FORMAL VS. INFORMAL STRUCTURE IN A PETROLEUM FACTORY

managers think they have a good image of the organization, social network analysis studies are showing that they have different levels of accuracy in understanding the network around them (Cross, Parker et al. 2001). As units move higher into an organizational structure, their work begins to entail more administrative tasks

that makes them both less accessible and less knowledgeable about the day to day work of their subordinates (Cross, Parker et al. 2001). In one of the studies they wrote about, they found out that a person low in the organizational structure was in fact the center of the social network; an example is given in figure 2. The figure gives a clear example of a possible difference between a formal and an informal structure. The authors also argue that the physical location of an employee also affects the interaction between co-workers; enabling them to use electronic ways of synchronous communication, like instant messaging, will improve their interactions. Although e-mail is an asynchronous method of communication it is used "synchronous" sometimes, this because people immediately respond on an message which is bouncing a few times till the problem is solved, this is called peri-synchronous communication (Tyler and Tang 2003).

2.4 E-MAIL CLIENT

This chapter explains the influence of the e-mail client on the phenomenon of responsiveness behavior. Since all e-mail clients have basically the same features, the influence of this aspect on the phenomenon of responsiveness behavior is not critical. However, some scientist developed some attempts to improvements for existing e-mail clients; in particular Microsoft Outlook. Can these improvements be a solution for the proposed problem? An e-mail client can be categorizes as a personal information management tool, which from now on will be abbreviated as a PIM.

Before referring to literature about current clients and already developed solution, I would like to re-emphasize the proposed problem. The main research question is; w*hat are the shortcomings associated with the transparency in responsibility for internal information flows through e-mail.*

The attempts of redesign to improve e-mail communication that are available are not designed as solutions for specific proposed problem. Though one article contains explanation that the reliability of e-mail is suffering the fact that the ad-hoc workflow processes of e-mail are not manageable (Scerri, Davis et al. 2009). Another group of scientists argued that although e-mail has taken a central role in task management, e-mail tools have remained relatively static while user's practices evolved (Belotti, Ducheneaut et al. 2003). Both teams developed an experimental layer over Microsoft Outlook. Scerri, Davis, Handschuh, & Hauswirth developed software to add semantics to e-mail; they go that far that their software is able to "read" a message and decides what a e-mail exactly is based on the Speech Act theory. Belotti, Ducheneaut, Howard, & Smith developed software to make e-mail more task-oriented.

All e-mail clients offer the same possibilities for archiving e-mail into folders. The e-mail user is free to build as much folders as he likes. Next paragraph will explore this way of organizing e-mail traffic.

2.4.1 CURRENT ARCHIVING USAGE OF THE CLIENT

Bälter studies the effectiveness of organizing received mail into folders (Bälter 2000). He published a study that suggested that deep filing of e-mail is not as efficient as it seems. The time it takes to file the mailbox can outbalance the time it safes when someone wants to find a received message. Bälter suggested a maximum of

30 folders to maintain the effectiveness of filing inboxes; the mean number of the participants of the research was 90.8 with a median of 27, the maximum was 400 folders. Strangely, the greater the e-mail experience, the higher the number of folders; this evolves the question whether more experience increases the effectiveness of e-mail or not. Folders are created based on different criteria, e.g. sender, organization, project, or personal interest. The main reason why the individuals file their mail into folders is to increase access-time to previous received mail. Further results showed that a few people use the search function of their e-mail client but almost all respondents use the sort function.

2.4.2 ATTEMPT TO IMPROVEMENT 1: BELOTTI, DUCHENEAUT, HOWARD, & SMITH IN 2003

Here a new layer over Outlook was designed, the Taskmaster. This system should embed task-centric resources into the e-mail client. The prototype they designed was tested during a two-week study. They are indignant about the fact that in Microsoft Outlook the inbox is separated from the task list; despite much of the received messages are indistinguishable from to-dos. They based their redesign on earlier studies of e-mail use. Only the user interface is redesigned without touching the infrastructure. In their research, they found a relation between the number of threads one is tracking per day and the length of the interval between the messages of these threads. The multiplication of these variables gave a better relation with e-mail overload then just the number of messages, this because when someone is keeping track of a thread with a large interval, the last message drifts away in the inbox when new messages arrive. The first part of their redesign are the Threaded Task-Centric Collections; this provides a semi-automatic system to build a collection of different items that belong together (to the same task) in your inbox. This can decrease the risk of messages drifting away. Like shown in the sample the list above represents a list of different tasks, below the items are visible related to the selected task. A second principle of this system is that they do not consider e-mail messages as always the carrier of attachments or links as classic e-mail clients do. Therefore the new system allows users to add these items to a task that has never sent by e-mail. The third principle is that items can have meta-information like a deadline, reminder, action or a color code. Using the theory of taxonomy, a semantic can be meta-information but meta-information is not necessary a semantic. The fourth principle is that the Taskmaster should be able to show more useful information at top-level. Therefore they added warning bars which show when the deadline

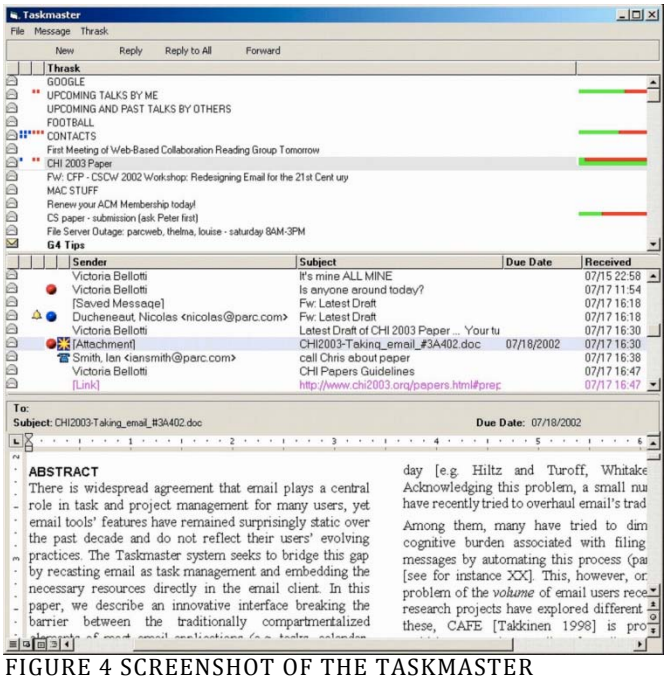

FIGURE 4 SCREENSHOT OF THE TASKMASTER

expires, they added action clusters to visualize the amount of actions related to the task, and task-specific contact lists to have easier contact with people associated with a specific thread.

The tool was designed, implemented and tested for two weeks by nine participants. The results proved that the positioning of e-mail as task management is something the users found undeniable necessary. Despite the poor quality of the software, some users are still using it after the experiment. The most important conclusion written in this research is that it is possible to significantly positively affect users' experience by embedding task management resources directly in the inbox(Belotti, Ducheneaut et al. 2003).

2.4.3 Attempt to improvement 2: Scerri, Davis, Handschuh, and Hauswirth 2009

The second attempt to improvement is quite recently developed. This tool also adds semantics to e-mail communication. They define e-mail as a transportation layer, which supports what effectively is a number of distributed and well-defined ad-hoc workflow processes. The developers noticed that the productivity of knowledge workers using e-mail suffers the fact that these ad-hoc workflows are not manageable. By adding semantics to e-mail, the developers wanted to enhance the functionality of e-mail to give workers better possibilities to manage their ongoing workflows. The software they developed isn't a change in the transport layer, not a new e-mail client but an extension for existing software, a complex theoretical model beneath a very simple graphical user interface, and it will be useful for everyone using e-mail. The technical method they used is Resource Description Framework (RDF)[1] to bind machine-understandable metadata to e-mail messages. An e-mail has one or more purposes, or action items. These action items can be subdivided into several categories; e.g. a meeting request, a task assignment or a file request. Action items can be translated into Speech Acts, the authors used these terms interchangeable. The authors have many experience with the usage of technology and the coordination of interactions among individuals, they found an acceptable balance between computability and communication.

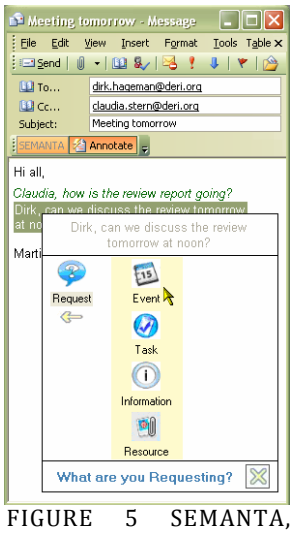

FIGURE 5 SEMANTA, MODIFYING AND

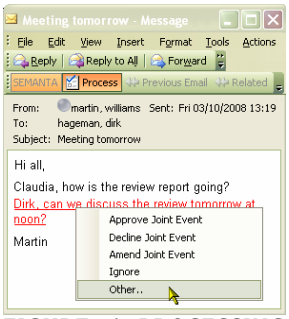

FIGURE 6 PROCESSING INCOMING MAIL

The solution is called *Semanta*. This software can recognize text within e-mail messages using text analytics services. Adding semantics to e-mail is getting in the neighborhood of Mansystems' demands. When someone sends a message, the sender can create an annotation of which is known whether it is a request or not; when it is a request, you can also indicate whether it is an event, a task, information or a resource. The answer on a request is also semantically arranged, answering a question is possible by choosing out of several pre-defined answers, an illustration can be found in figure 5. Another advantage of adding semantics to

[1] http://www.w3.org/RDF

e-mail communication is that it is easier to track. Workers can now see an overview of all pending tasks, both incoming as outgoing. Mansystems wanted to make task management better traceable for higher management, these test results can therefore be of high value in the development of a new systems.

Semanta is tested involving six computer science researchers, though this is a small sample, previous research have revealed that 5-12 users are acceptable for a systems usability study. The results should give underpinning for further development, a later release is going to be tested on a wider audience. Some problems were that the semantics were improperly extracted out of the e-mail messages. The respondents appreciated the fact that they had an overview of all sent messages they were expecting a reply from, without the system and only Microsoft Outlook they took an average of 6.66 minutes to find out of which messages they did not received an answer yet. Users can normally remember 35% of the incoming tasks against a 65% outgoing tasks without checking the e-mail client. The respondents were highly appreciative about the action item tracking function.

2.5 CONCEPTUALIZATION

The literature review partly answers the sub questions proposed in the problem description. Lack of completeness, outdated conclusions and missing elements are the guidelines for the following research. But how might this research look like?

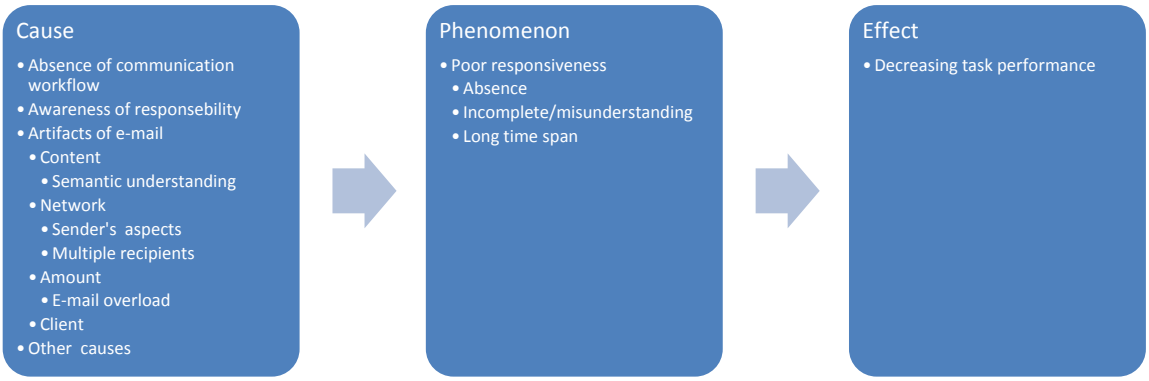

FIGURE 7 CONCEPTUALIZING THE PHENOMENON

Again, this research is intended to proof a phenomenon. What causes this phenomenon, and what is its effect? The literature review has shown multiple possible causes. Below there is a short summarization of the literature.

2.5.1 CONTENT OF INFORMATION FLOWS

The high and still increasing importance of information results in the availability of plenty of literature describing information flows. This literature was the underpinning for a better understanding of the usage of e-mail. An e-mail is an ad-hoc workflow, which contains a speech act in order to inform someone. E-mail has

therefore, in probably far most companies, no pre-described workflow. The ad-hoc workflow that arises when someone sends an e-mail is most dependent on the speech act within the e-mail. It is important to mention that one e-mail can contain *multiple speech acts* (Cohen, Carvalho et al. 2004). A speech act could be a request, a question, a promise, a challenge, or information. A request or a question needs response; this response has a certain quality and response time. This response is a task; people are using e-mail for task management by using their inbox as task overview.

2.5.2 ROUTES OF INFORMATION FLOWS

The ease of e-mail as the major non face-to-face asynchronous communication method had great influence on the social network in which people communicate with each other. The hierarchy of an organization is the same as the formal network, the social network in which people communicate is in the literature explained as the informal network. The network theory provides methods to map these informal networks. Since E-mail is digitally stored, it provides great opportunities as indicator for these informal networks. These results offer valuable information about how people collaborate and exchange knowledge. It is important to mention there does not necessarily have to be similarities between the formal and the informal network. Another highly important effect of the ease of this communication method is the number of recipients someone can send a mail to at once; this might have influence on the feeling of responsibility to respond.

2.5.3 RESPONSIBILITY

The literature is leaving many gaps in the sense of responsibility within communication networks. In fact, no author was found at all building this thesis that has mentioned this subject. Responsibility has to be assigned and described in your job function. Most job functions lack description about responsibility in the sense of e-mail communication and individuals are therefore hardly accountable for poor responsive behavior. A specially developed software tool might increase the transparency of responsibility.

2.5.4 REACTION ON INCOMING REQUESTS

This is the most important question. The core problem is that people do not always respond on e-mails that do need a response. The research should give more insight in what might be a cause of this effect. Causes might be:

- Lack of feeling of responsibility
- Lack of workflow description
- Lack of functionality of the e-mail client or infrastructure
- E-mail overflow

The last three causes were tested in other research and were proven significant. Researchers also developed solutions for these causes, which are also described in this thesis.

- Lack of semantic understanding
- Other causes which will emerge in the qualitative data of this research

2.5.5 THE AMOUNT OF INFORMATION FLOWS

The amount of e-mail someone receives in a specific amount of time has influence on to what extend someone experience e-mail overload. E-mail overload has influence on the quality of a response and the responding time.

2.5.6 REMAINING RESEARCH

People are using e-mail for task management; authors understand that current e-mail clients are probably not appropriate for task-management. There are many historic survey data of the usage of e-mail, but the results might vary from a study in a different setting, how to measure the independent variables of the setting?

The lack of understanding can be a problem for the responsiveness of an individual, because an e-mail can contain multiple speech-acts, an e-mail can also be partly misunderstood.

There is a lot known about the network theory; this theory can help to map the informal network, maybe some relations show up associated to responsibility.

The most important question now is:

> *"How to measure absence, poor quality, or the long duration of responses on requests in one single case?"*

3 RESEARCH METHOD

Now the attributes of e-mail are explained it is now clear where to look for the problem. When the problem is explored, there is a direction where to look for a solution. A case-study design will focus on the dynamics present within a single setting (Eisenhardt, 1989). This single setting is the organization of Mansystems BV. The question that now arises is how to perform a research that supports the exploration of this problem. The research should give insight how people within an organization communicate with e-mail. This has been done before using an inbox walk-through (Tang & Tyler, 2003) (Fisher & Dourish, 2004); in this case the researcher joined the e-mail user looking at the e-mail client to measure the content of e-mail communication and how did the user reacts upon requests. This method is very time-consuming.

The research should give insight in the four most important attributes of e-mail, which are the network, the content, the amount of messages, and the e-mail client. The units of the research are e-mail users within Mansystems. A possible examination is to confront e-mail user with their own e-mail behavior. When this could be automated, a lot of data will emerge in a short period of time. There is no automated method available to measure the phenomenon; therefore, it has to be designed. The functionality of the automated method should contain the following elements:

- Download the respondent's e-mail messages
- Let the respondent answer questions about e-mail messages
    - From colleagues only
    - From a specific time-span
- Save all data for analysis and delete all data that is not necessary
- Analyze the data

The outcome will provide many data, which will explore the communication behavior within this organization.

3.1 UNITS

The sample is extracted out of the employees of Mansystems. The sample will be selected upon the job function, so the results will be generalizable to all employees of Mansystems. Using the theory of Yin (2003) about case study research, the results might be generalizable to a larger population; but the generalizability is upon the reader. The most appropriate sampling method is quota sampling. Probability sampling might cause lack of external validity since there are many different job functions within Mansystems. These different job functions may have direct influence on e.g. the responsiveness behavior, therefore the sample must consist the same rate of e.g. developers or sales representatives as in the whole company. In quota sampling, the sample is chosen based on pre-specified characteristics so that the total sample will have the same distribution of characteristics assumed to exist in the population being studied(Babbie 2007). The population can be divided into multiple strata based on important independent variables; a random sample can then be

selected from each stratum. This is called a stratified random sample(Shadish, Cook et al. 2002). The independent variables that most probably influence the usage of e-mail are the function of employees and the department they are situated.

As mentioned before the respondents have to answer questions about their own e-mail usage while they are confronted with their own e-mail communication. In an ideal situation the research sample is 100%, in that case a request and it's respond could be matched to find out whether there is semantic understanding or not. When the sample size is reduced to 20%, will the "match-able" messages also be reduced to 20%? This is probably not the case.

The usage of network theory should give a more insight in the physical attributes of the problem. The acquiring of these data should be of no effort for respondents due to automatic message synchronization with the survey tool. Should there be two groups of respondents? Both with all communication channels registered and one of which the messages of a specific time-span are surveyed.

So, to select a group of employees who are representative for all the employees of Mansystems, there need to be:

1. gathered a list of all the employees with their function and their department,
2. and selected a sample in a way that every function and department is represented, but the largest part of the sample will consist of respondents who are to a larger extent depending on e-mail communication.

3.2 TREATMENT

This is the most extensive part of the research. The problem is how to find out whether or not the phenomenon takes place in a specific setting.

Although it is possible to perform this research only using interview data, this endangers the internal validity of the research since there probably is a difference between the human perception and the actual existence of the phenomenon.

The treatment is to confront e-mail users with their own e-mail behavior and let them answer a few questions for every received e-mail from a specific period and then to select a few cases to gain further interview data. The objective is to find out what exactly is received and how the respondents have reacted upon these e-mails and then to gain interview data to find out the difference between the actual existence of the phenomenon and the way people experience the phenomenon.

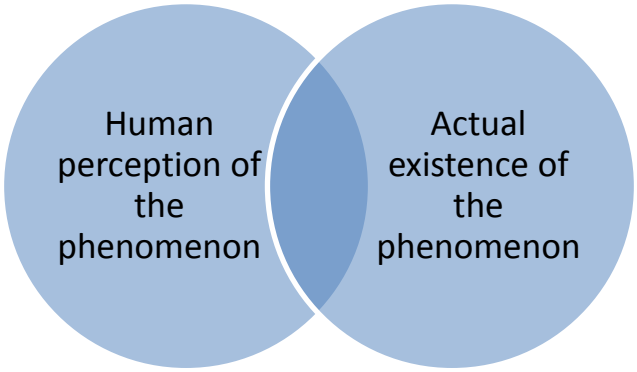

FIGURE 8 THE HUMAN PERCEPTION AND THE ACTUAL EXISTENCE OF THE PHENOMENON

To find out the actual existence of the problem, a special research tool has to be designed. The software should be able to determine whether the phenomenon takes place or not in this case, and must be able to find correlations when the phenomenon takes place.

After that, these quantitative data will be extended with qualitative interview data to find out the human perception of the phenomenon. These interviews might reveal other causes of the phenomenon. In this part there will be a few cases explored deeply using all available data of the subjects.

3.2.1 SOFTWARE DESIGN

In this chapter, all technological elements of this research are explained. Because this research has never been done before using this method in this setting, no existing software was available which was able to perform this research. The main system's architecture consists of the research tool, the database management tool, the data analysis method, and the database itself. All tools were yet available before this research except for the Research Tool, which has to be newly designed.

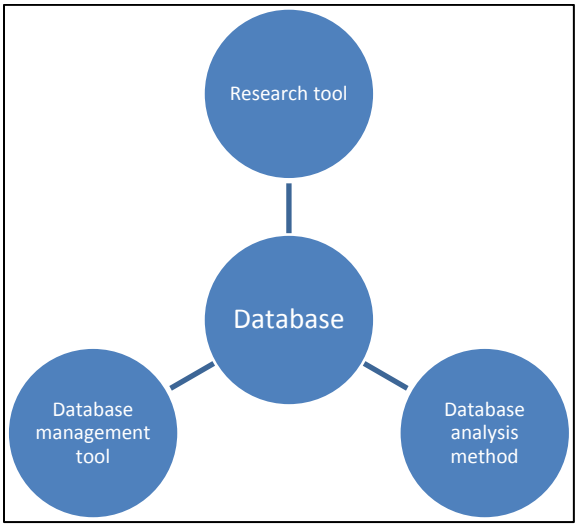

FIGURE 9 THE MAIN SYSTEM'S ARCHITECTURE

Database management tool

The database management tool was already developed; this tool was originally designed by myself and is able to design, simply analyze, and to modify databases that supports websites. Since the research tool is web-based, this method is ideal in this situation. This tool is used to build the database explained in the next section.

The database

Using previously described tool, a database was designed that supports all the information flows. The basic tables in the database contain the respondents, their e-mail flows and the questions they have answered upon these e-mails. The database contains several tables for storing and providing the data that supports all three elements. The first table [Users] contains the users that have access to the database management tool. Because of privacy issues, there is only one record in this table. The second table [Respondents] contains all the employees of the company, whether they participate in the survey or not. The [E-mail messages] table contains all the messages of all the respondents. The research tool uses this table to present the respondent the e-mail where they have to answer the questions about. These questions are then stored in the next table [Survey]. The [Blocked To-Field] table contains the e-mail addresses that when a message is sent towards this address it is probably not useful for answering the questions. There is only one address in this table [iedereen@mansystems.nl]; messages sent to this e-mail address, will be redirected to everybody.

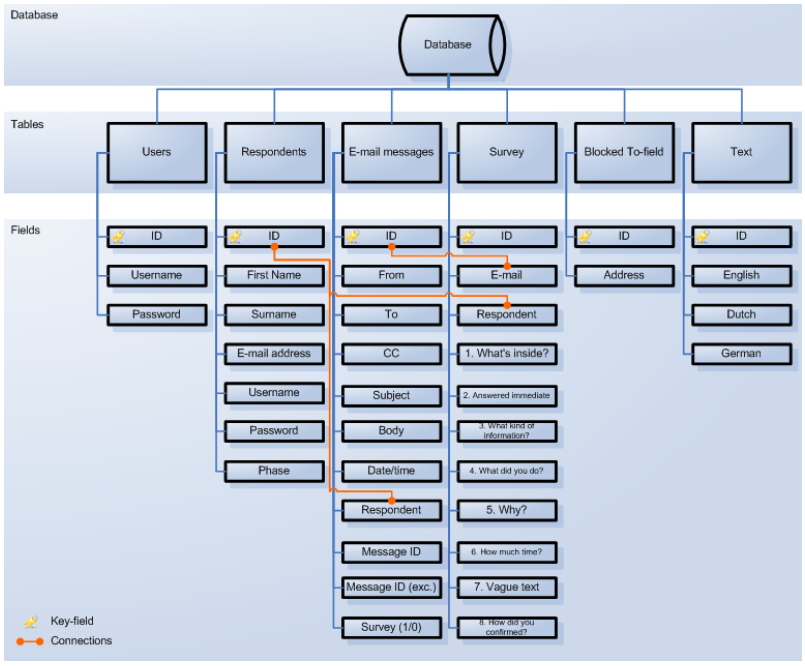

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FIGURE 10 DATABASE ARCHITECTURE OF THE RESEARCH TOOL

The research tool

This is the most crucial part of the development. This part is completely specific developed for this purpose. A suitable design framework for this development is the Function-Behavior-Structure framework (Gero & Kannengiesser, 2003).

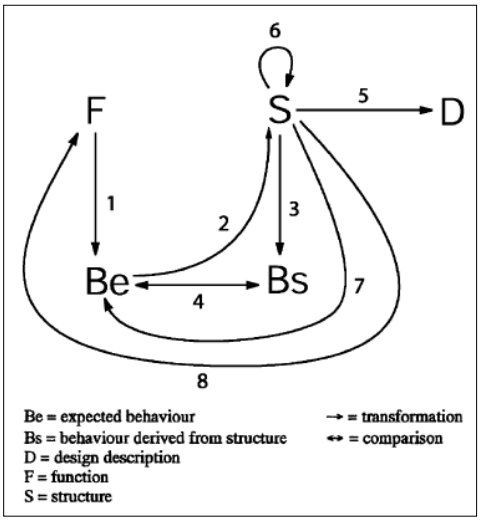

FIGURE 11 FRAMEWORK OF GERO & KANNENGIESSER (2003)

This framework highlights the different between the expected behavior and the behavior derived from the structure. This design method provides eight different steps, which have to be performed in order to get what you want and to adjust the requirements during the design process according to new developments.

Process 1: The function variables have to describe the teleology of the object. This tool has to be able to follow the next steps, which are the Functions of this tool:

1. Connect to an inbox.
2. Download every e-mail from the inbox and store them into a database. The inbox will be downloaded using the POP3 protocol. The Microsoft Exchange server will provide all e-mails in the inbox whether they have been read or not. This excludes messages that have been filed into a different folder than the inbox. Some employees file all their mails into folders, these e-mails are then not available for this research. These employees cannot be a respondent for this survey.
3. Ask questions about some e-mails that meet specific demands:
    - They need to be from a specific period
    - They need to be from a person, so not automatic generated or spam
    - They have to contain work-specific requests or information
    - They have to be sent towards one single or a small group of recipients

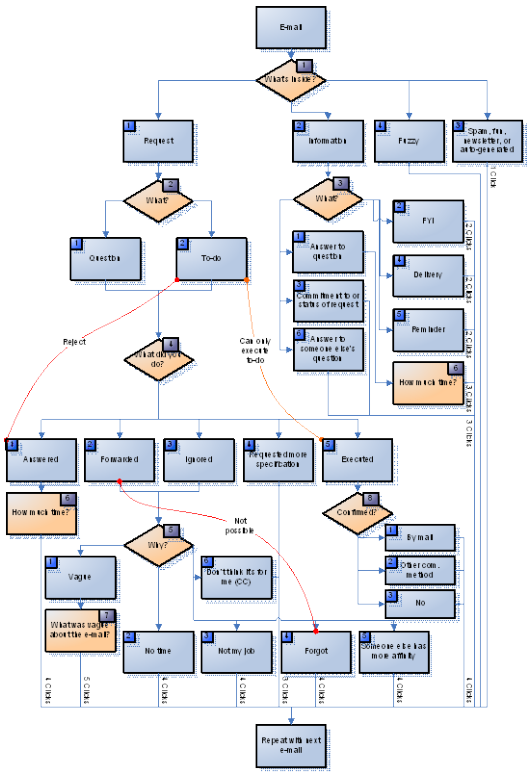

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FIGURE 12 RECURRING PROCESS FOR EACH QUESTION IN THE RESEARCH TOOL

There are eight different questions of which only, according to the flowchart, some of them need to be answered based on their content. This survey tends to find what the sender's purpose is and how the receiver responded upon the message. To find out whether it is a request or not the first question will derive the most important property of the message. Since e-mail messages may contain multiple speech acts, the user is asked to choose the most important goal of the message. Below you will find an explanation of all the questions. The numbers below match the numbers of the orange boxes in the flowchart.

This question offers four different answers; a request, information, fuzzy, or spam, fun, newsletter, or auto generated. Some e-mails can be categorized into more options. Therefore, the options are ranked, the first option that matches the e-mail should be chosen.

1

Spam, fun, newsletter, or auto generated

Fuzzy

In this case you're not sure what the sender exactly means by sending the message; e.g. does he want you to act upon or does he just want you to know something. The last example can occur in case your name is in the CC field or you're one of the many names in the To-field.

Request

In this case you're sure the sender wants you to act upon this message. This could be done by

answering a question or execute a task.

Information
This option has to be selected in case the sender wants to inform you. This includes answers or commitments to your requests.

When the user answered the main content of the message is a request it can be a question or a to-do. The to-do differs from the question when the question requires other action than just answering the question.

2

Question
In this case the sender of the request wants you to just answer a question because the sender assumes you posses the knowledge

To-do
The sender wants you to perform some task other than just answering a question.

The third question has to be answered when the user indicated the main content is information. This could be separated into six different types of information. At first, it could be an answer to the user's own question; this is the most important measurable type of information because after this the time span could be given between the initiation and the time the user answered. The remaining possibilities are listed in the explanation below.

3

Answer to your question
You asked a question, this is an answer whether it is useful or not.

For your interest
The sender has something that might interest you

Commitment to or status of your request
You assigned a task to someone; the person commits to the task or gives a status report of it.

Delivery
This message contains one or more attachments. This should not be initiated by a request by you; in that case it's a "commitment to or status of a request".

Reminder
The sender reminds you of something that you have already agreed on.

Answer to someone else's question
In this case, the message enclosed an answer to a question that is not asked by you. This can be for example a reply-to-all or from someone that want you to know about the existence of the enclosed

knowledge.

The fourth question is preceded by the second question about the type of request. Since a request requires a response this question is about how the user reacted upon the request. This is the most important question of the survey. When the user answered multiple of these questions the responsiveness behavior becomes measureable.

4

Answered
You have answered the question

Forwarded
You have forwarded this request to another colleague whom might be more able to respond on this or has more time for it.

Ignored/ did nothing yet
You did nothing with or without a reason.

Requested more specifications
Te proposed request was not clear enough, therefore you have requested more specification.

Executed
You have executed the proposed task; of course you cannot execute a question. (This one becomes available when the user answered "to-do" in the second question for obvious reasons).

In the cases that a user answered "forwarded" or "Ignored/did nothing yet" it is important why that happened. There are six different possibilities.

5

Because it was vague
The message was too vague to give a proper reply on it.

Because you got no time or still had no time
You just didn't respond on it.

Because it's not your job
Responding on this message does not belong to your set of tasks.

Because you accidently forgot it
You intended to respond on this message, but you accidentally forgot (this option is not available when the user selected "forwarded").

The persons I have forwarded this message to have more affinity with this

This option is when you think the process will be finished more efficient or effective when someone else will take care of this (this option is not available when the user selected “ignored”).

This message is sent to multiple persons, I do not think I have to respond on this
You are one of the recipients, the probability that some other recipient will take care of this is high (this option is not available when the user selected “forwarded”).

This answer need to be answered after the user indicated that he has answered a question or has received an answer on his own question.

6 *How much time did it take?*

Directly
Less than an hour
Half a day
One day
A few days
A week
More than a week

The following question is asked when a user indicated he did not responded upon a request because the content was vague. The user then has the possibility to copy/past the text of which he thinks that makes the message is unclear.

7 *What was vague about the e-mail?*

This question is asked when you user has indicated he executed a to-do. Logically the initiator of the task would like to know the status of the to-do, therefore the user can indicate whether or how he confirmed the finished to-do to the initiator.

8 Have you confirmed that you have executed the to-do?

By replying with an E-mail
By other communication methods
This could be everything except e-mail; e.g. face-to-face, phone, text messaging, or instant messaging.
You did not confirmed

4. After the questionnaire the e-mail texts have to be emptied end e-mail addresses have to be converted into numbers in order to maintain privacy

Process 2: This step is to transform the previous described requirements into a solution structure. This structure applied should then cause a behavior, which is visualized as Bs in the scheme. This structure is based upon the designer's experience. This structure contains the different elements used and a description how they relate.

The elements:

- Microsoft Windows 2008 server
- Internet Information Server 7.0
- An internet application build in Active Server Pages; the most important files:
  - main_survey.asp This file regulates everything that's support everything that has to do with getting the survey tool working into the respondent's browser
  - phase_0.asp This file provides the possibility to log on
  - phase_1.asp This file provides the possibility to connect to the respondent's inbox
  - phase_2.asp This file is the survey itself, this file is used again for every e-mail
  - phase_3.asp This file provides the possibility to end the survey, it will show that every e-mail's text is removed and e-mail addresses are converted to numbers
  - process.asp this file provides all the data actions

The next figure shows how they are connected to each other:

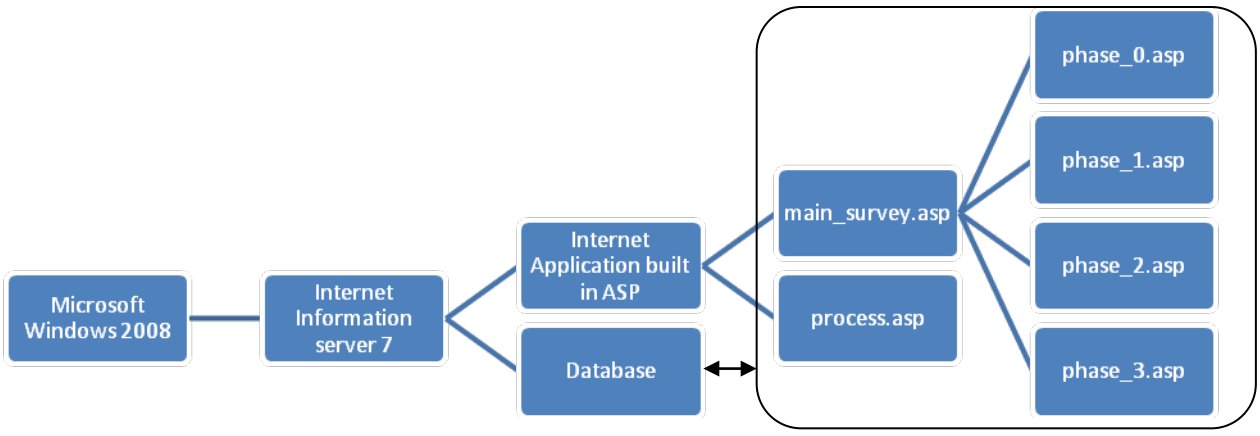


FIGURE 13 CONFIGURATION OF ALL TECHNICAL ELEMENTS OF THE RESEARCH TOOL

Process 3: Analysis how this structure responds in real live. This is possible by testing it using test-respondents.

Like many software-development projects a lot of problems showed up at different stages. Therefore, the structure need to be adjusted in order to let the behavior derived from the structure match the expected behavior. During test-phase there were coming up a lot of unforeseen problems. So there was a difference between the expected behavior and the behavior derived from the structure; these differences needed to be repaired in the next steps.

Process 4: The evaluation whether the behavior derived from the structured matches the expected behavior indeed

Some differences between the expected behavior and the behavior derived from the structure were:

- The database crashed while handling lots of data because one field that should be indexed wasn't
- When answering questions in multiple times, the user was presented the first question in later sessions instead of the first unanswered question.
- One step of the procedure of questions was not available.

Process 5: Producing the design description

In this process, the actual software is programmed. Since the simplicity of the research tool, describing this and the next processes does not have any benefit for understanding this research. This also since this theory was designed for alternative usage of software then its original purpose. In this case the expected behavior was mainly the same as the behavior derived from the structure.

3.2.2 QUALITATIVE INTERVIEWS

The software design, described in the previous section, can provide results with high statistical validity. Although these results can show whether the phenomenon takes place or not, people can experience this phenomenon different. Qualitative interviews therefore should go deeper in to a few cases and highlight differences between the way people experience the phenomenon and actual existence of the phenomenon. The questions are built based upon the conceptual model. After the interview the answers should reveal how interviewees experience previously discovered causes of the phenomenon, but the answers can also reveal new possible causes.

#1: Do you feel responsible for the continuity of your colleagues whenever it is in your possibilities to involve?

The first question is to find out whether someone feels responsible for the continuity of fellow colleagues in general instead of only the feeling of responsibility when just for filling a request sent by e-mail is enough. Responsibility is hard to research since it is somehow a vague definition, but the lack of transparency in this matter is one of the causes of the phenomenon. Especially in decentralized organizations this is an important issue.

#2: Do you feel responsible for responding on an e-mail (or the executions of an enclosed task) in general?

This question focused on the feeling of responsibility in cases requests are sent by e-mail. Some properties of e-mail, e.g. the informality, multiple receivers, or the easiness of just sending a request, can influence the feeling of responsibility of the receiver.

#3: Do you think your respond times are above or below average responding times?

#4: Do you think you respond times are too slow?

#5: Do you think your respond times could be improved?

The phenomenon covers poor responding upon requests, so also late response. This part is measured in the quantitative part of this research, but the awareness of e-mail users is also important. The literature showed that responsiveness image of others influences the way people address their requests. People who are optimistic about other's responding time are more likely to send requests.

#6: How do you think the quality of the answers you send relate to the answers that are sent to you?

Like respond time, the phenomenon also exists of response quality. When e-mail is answered in a short time span it is still possible the answer has insufficient quality; the answer could be incorrect or incomplete. The relation between the quality of the respondent's response quality and the average response quality should give an indication of this.

#7: When you send a mail with question(s), how do you consider the average completeness of the answer?

A severe problem of the responsiveness behavior of e-mail user is the incompleteness of their responses. This is mainly the case in a situation an e-mail contains multiple requests. Often the requests are then partially answered which then causes the e-mail user to send one single e-mail for every question which in turn can increase e-mail overload.

#8: How do you think your satisfaction about the way your mail is replied could be increased?

Since e-mail user might experience this phenomenon often, they probably philosophize about a solution for this problem. This question can generate data for a possible solution for the problem.

#9: Do you use your mailbox for task management?

#10: Do you use your mailbox for personal archiving?

#11: Do you use your mailbox for a-synchronous communication?

E-mail is sometimes used for things for which e-mail is not designed. Research showed that e-mail is used for of course a-synchronous communication, but also for task-management and personal archiving (Whittaker & Sidner, 1996). The last to uses can have effect on the phenomenon.

#12: How many folders do you have to file your e-mail?

Filing e-mails in folders can have effect on the phenomenon. There is an ideal number of folders for dealing with e-mail.

#13: When do you check your inbox?

The way people check their inbox can have an effect on the feeling of e-mail overload, which in turn has an effect on the phenomenon.

#14: How do you keep track on your outgoing tasks?

#15: How could a personal information management tool be improved in order to give a better overview of in- and outgoing tasks?

E-mail users sometimes have to deal with large amounts of incoming tasks, but also with the tasks they have sent towards others.

#16: The asynchronous character of e-mail communication gives users freedom to respond on an e-mail whenever they like to, do you think there is a way to have this way of communication more synchronous? Do you use e-mail peri-synchronous sometimes?

Since the purpose of this research is, besides investigating the phenomenon, also to build foundation for a solution. Peri-synchronous communicating through e-mail is a phenomenon when people are having a conversation with e-mail. In this case people respond on e-mails in a very short time-span and expect a message in return in that same amount of time; this looks like "chatting". Sending requests with instant messaging tools can be an effective solution for the phenomenon. This question tends to find out the experiences of the respondent in the sense of this.

#17: Discussion about the integration of the proposed solutions in the literature. (Belotti, Ducheneaut, Howard, & Smith, 2003) (Scerri, Davis, Handschuh, & Hauswirth, 2009)

There are two possible solutions for this phenomenon built in the past; which are described in the previous chapter. This discussion tends to find out the respondents opinion about these solutions.

#18: Do you think your results are representing your e-mail behavior?

#19: Do you think the results are representing the average e-mail behavior in this company?

#20: Do you think the survey is missing some important measureable elements about e-mail communication?

The last three questions are important to test the validity of the quantitative research with the experience of the interviewees.

#21: Can you explain three or more advantages of e-mail?

#22: Can you explain three or more disadvantages of e-mail?

It can be possible there remain some important elements overseen, maybe the interviewee has some important additional factors.

#23: Do you have experience with incompleteness of questions or other vague requests? E.g., you considered an e-mail as being just information but it turned out this was actually a request.

The lack of semantic understanding the content of an e-mail can be problematic. This cannot be tested with the quantitative research. Lack of semantic understanding can be a cause of the phenomenon.

#24: What do you think that causes the phenomenon?

#25: Where do we need to look for a solution?

Maybe there are some independent variables overseen which cause the phenomenon. The interviewee can provide all possible causes of the phenomenon.

#26: What do you think that are the effects of the phenomenon?

Maybe there are some effects of the phenomenon which are overseen. The interviewee can provide all possible effects of the phenomenon.

3.3 SETTING

Quantitative

To maintain internal validity the setting is a normal work environment. The questions that have to be answered are about historical data, their inbox messages between 21 and 7 days ago. These messages are filtered according to whether they are from a colleague from this company. The respondent can choose his or hers own moment to participate within a specific time span of initially a week. Some respondents participated within a month due to lack of time, not understanding the application, or technical failure.

Qualitative research

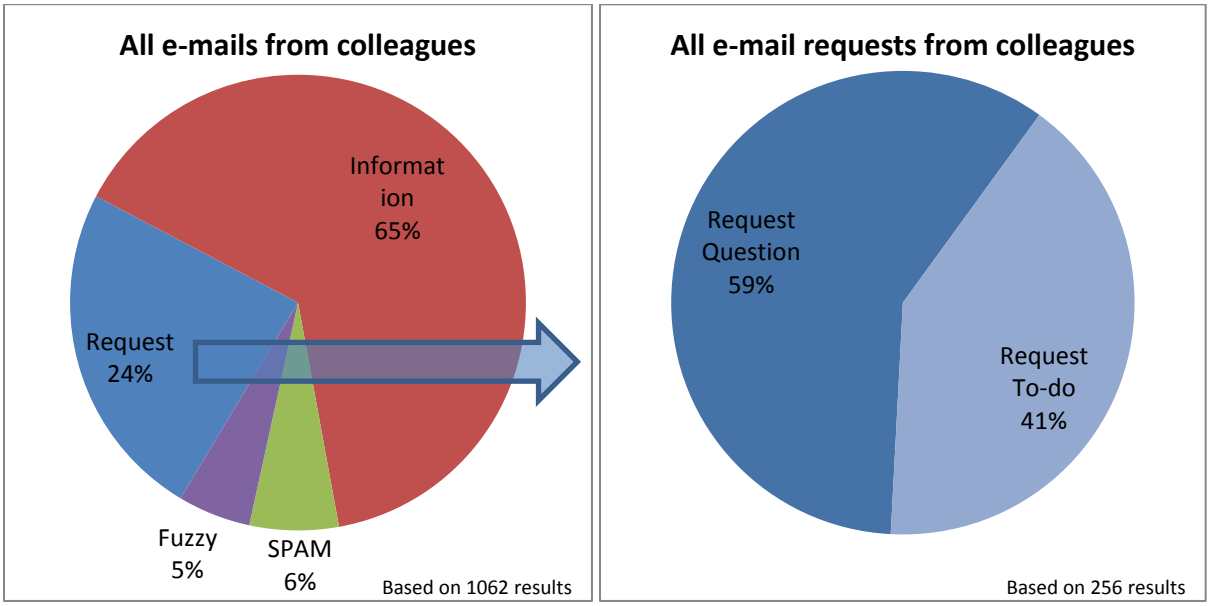
The setting of the interviewee is similar to the setting of the quantitative research. A sample of interviewees is selected from the respondents from the quantitative research.

4 RESULTS

This chapter will present the results of this research. These results will contain quantitative data explained with the literature of which this concept of e-mail is based on and qualitative data from the interviews.

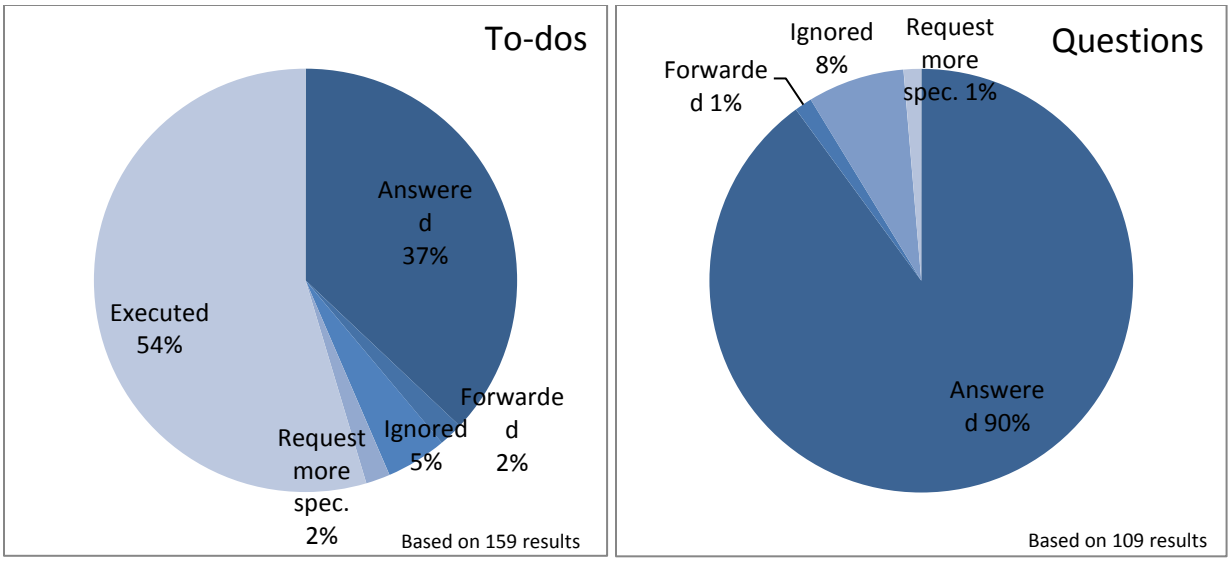
4.1 CONTENT AND HANDLING OF INFORMATION FLOWS

The content of and especially the handling upon information flows per e-mail is the most important part of this research. During the quantitative research, the response upon the requests can only be determined upon its content. The next results are based on a sample of 1060 e-mails.



GRAPH 1 THE AVERAGE CONTENT OF RECEIVED E-MAIL

In the graph the basic content of the information flows are printed. Like in the process in chapter 3.2.1 this is based on the very first question for each e-mail. Remark that this is only based on e-mail communication between colleagues. When the filter malfunctioned, the respondent still has the possibility to classify a message as spam. At Mansystems, 24% of the average incoming e-mail messages are requests, so they need a response. In the following graph the requests are subdivided between questions and to-dos. Of the requests, 59% need a response as an answer on a question, the other 41% need other response like the execution of a task.



GRAPH 2 WHAT RESPONDENTS DID WITH TO-DOS AND QUESTIONS

When the main problem of this research occurs, lack of response on a request, it should evolve within the folowing question, "What did you do?". Of cours e these graphs should be very different. The following graphs show 5% of the to-do's are ignored and 8% of the questions are ignored. During the research a future improvement of this research showed up. In case of a to-do and the respondent clicked on answered, this might be not satisfying to the sender because the respondent answered with a rejection. However, the sender of the to-do now knows what he can expect so he can rephrase, re-address, execute by himself his to-do instead of waiting for nothing.

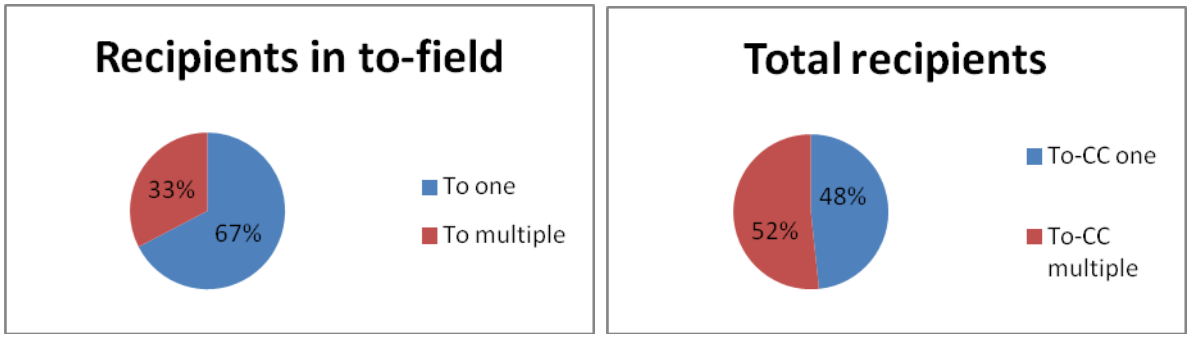
So why are requests ignored? It's not easy to say, although there is quantitative data, it is insufficient to base conclusions on since there are only 19 ignored requests.

- Vague 0
- No time 8
- Not my job 4
- Forgot 1
- Someone else more affinity 1
- Don't think it's for me 5

Three of the ignored requests were actually requests to cooperate in this research, eight of the ignored requests were sent to more than one person. This research lacks possibilities to determine the importance of a request, so even if there were larger number, it is impossible to measure the actual damage to the business's continuity. Qualitative data should give more insight in this phenomenon.

Like written in the previous paragraph, eight ignored requests were also sent towards multiple recipients in the to-field; which does not have to mean that that is also the reason the request is ignored. But how often

does this take place? Based upon 8.596 e-mail messages there were 33% of them sent towards multiple recipients (only in the to-field), 52% of them were sent towards multiple people including the CC-field.



(Based on 8.596 results)

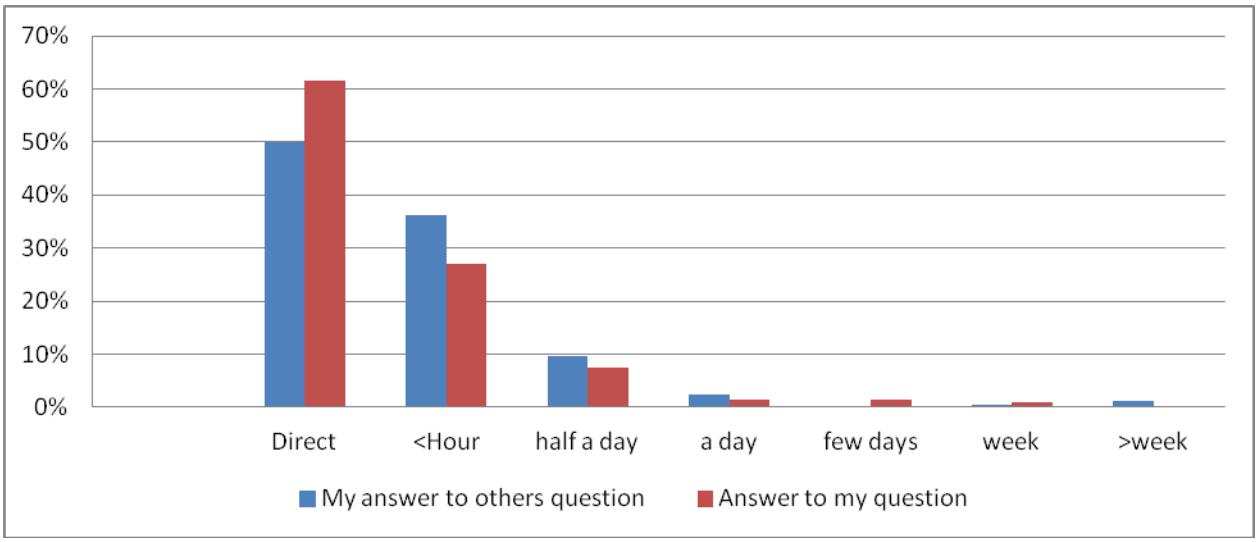
GRAPH 3 HOW MANY RECIPIENTS AN E-MAIL IS SENT TO

During the interviews the respondents notified they are all familiar with the phenomenon but do not experience this phenomenon as very problematic; which can be expected after looking at the quantitative data. Since all respondents experienced this phenomenon somehow, a variety of reasons came up.

This research focuses on the phenomenon on internal communications; the feeling of responsibility on the continuity of your colleagues work might have influence on the willingness of someone to act upon a request. In the interviews, all respondents felt responsible for their colleagues; but there were some other artifacts on this. One respondent felt more responsible to act upon his manager requests then to act upon requests of his colleagues on the same level in the organization. Somehow he felt more responsible when he has a nice relationship with the sender then in a case of someone he doesn't like. Another respondent answered he felt this responsibility all the time; he even said: "I will always intervene when someone contacts me directly".

Response time

Response time is another important item on the phenomenon; someone can answer a request perfectly, but when it takes too much time, it can still be hazardous for the organization's continuity. The quantitative data showed a surprising result. The respondents believe that their response time is higher than the response time of their colleagues. These data might serve as proof that the self-image of someone's responsiveness behavior is underestimated or that the responsiveness behavior of colleagues is overestimated; since in an ideal situation the two bars in each time indication should have the same height.



GRAPH 4 RESPONDING TIMES

This graph is based on 174 answers given by the respondents and 214 answers sent towards the respondents, so unanswered questions are not included. These data also show that 96% of the requests of the answer sent by the respondents and 96.3% of the answer to their own questions are sent within half a day.

4.2 E-MAIL INTENSITY

The results of this part of quantitative data determine the number of e-mail messages the respondents of Mansystems receive. Since the phenomenon was not proofed during this quantitative research it is not possible to base correlations on these data.

When the phenomenon would have been proved in this research, a correlation between the number of occurrences of the phenomenon and the average number of messages every week could prove the effect of e-mail overload. Statistical measurements using independent variables like the number of incoming requests, or further acuminated variables like incoming questions or to-dos can provide more specified results. Further research in multiple organizations should provide more information.

Resp.	Avg.mes./week	Resp.	Avg.mes./week
56	76,00	140	7,21
102	56,90	163	81,00
80	72,73	21	63,11
50	79,90	110	44,17
98	14,14	75	16,17
171	27,86	97	11,00
105	115,80	146	30,88
96	100,75	69	6,50
47	102,50	11	9,75
101	150,00	27	46,78
35	3,82		

48	21,53

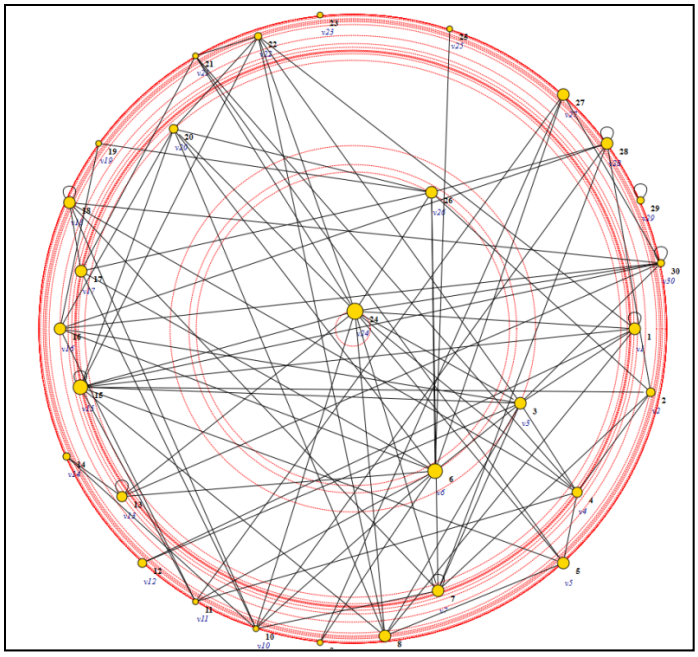
TABLE 1 AVERAGE MESSAGE PER WEEK

4.3 NETWORK

The research tool is ideal for gathering data of who is actually communicating with whom. There might be a relation between some sender's entities and the likelihood of the receiver to respond. The quantitative data showed some elementary social networks but lacks possibilities to measure the effect of these sender's entities since the quantitative data does not contain enough ignored requests. Therefore, the quantitative data lacks two important aspects why it is insufficient:

- The data is based on the inbox, not over the two weeks where the questions were about, but all the messages in the inbox. Since not everyone leaves all the e-mail in the inbox the data might miss important communication flows, i.e.: when the survey system has captured e-mail data of one month, you miss information about the other months; e-mail communication intenseness between two persons might heavily fluctuate over time. Using e-mail server's log files for this analysis should improve the quality of this analysis; this because this can be based on e.g. one year of e-mail usage.
- Only a sample is selected out of the whole population in an organization. Since the data only contains data from the respondents of the survey, important information routes may be missing in the results. This can also be solved using e-mail server's log files.

However, this method provides a way of determine the social network when all e-mail communication data is gathered using an improved method of data gathering. This improved method should be able to get data over a longer time span and from a larger population. In this case there is a visualized social network of all respondents of the research based on every message in someone's inbox. The figure shows this social network, the higher the betweenness centrality; the more central a person is arranged.



GRAPH 5 THE NETWORK ANALYSIS - BETWEENNESS CENTRALITY

4.4 E-MAIL CLIENT

All respondents were using Microsoft Exchange 2007 as e-mail client. Because the research tool can only be used with the e-mails in the inbox, respondents who have organized their messages into folders beside the inbox were not able to execute the survey as proposed. These respondents have summarized how they use their e-mail client to sort e-mail messages into different folders. Because the actual purpose of this research is to investigate e-mail behavior in order to find out how "e-mail" could be improved, information about how e-mail users are using their client right now can be of additional value.

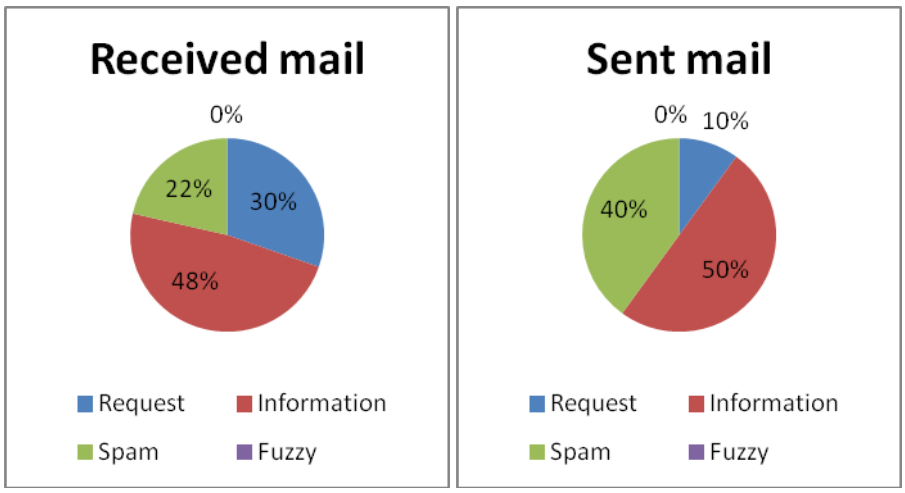
In total there are 11 e-mail users who explained their e-mail organization behavior. So these data only contain explanations about the way e-mails are organized into folders.

Based on these data it is clear that archiving inboxes on customer or project is very popular. Note again that the data above are only the respondents that uses folders, users that do not use folders intensively were not included in this part of the research.

4.5 CASE STUDIES

This section will go into the human perception of the phenomenon and its possible causes. After the presentation of these qualitative results the differences between these results and the quantitative results will be taken into account in the following conclusion.

4.5.1 INTERVIEW 1 – ID 98



GRAPH 6 RESPONDENT 98 (RECEIVED MAIL BASED ON 56 E-MAILS)

E-mail routes and its content

The first part of the interview, about responsibility in general, the respondent finds himself responsible for the continuity of his fellow workers; although it depends on some other variables. It depends on whether he likes that person or not. He feels more responsible for processes of his manager then for the processes of colleagues of the same hierarchical level or subordinates. He finds himself responsible for received tasks until he decided not to act upon received requests.

About responding time the respondent is very clear. When a request arrives, he answers mostly immediately; otherwise it will take a lot more time, sometimes a week or not at all. The respondent answered on question #4:"I react quickly, even in the evening or in the weekends". This matches his feeling of responsibility. The respondent gave also a few improvements of which he thinks it might increase the response time.

- Usage the "priority function" of the e-mail client correctly.
- A telephone call after sending the message for confirmation.
- Because e-mail can be impersonal, he suggests to use other communication methods for important things, like telephone or face-to-face.
- Sometimes he doesn't respond on a request as "punishment" because something that happened in the past. He also forwards requests to colleagues as this kind of "punishment".
- When he sends a request using e-mail, he tries to formulate the request like it is amusing to execute it.

The next section of the interview copes with the quality of responses. The honesty of the respondent showed some important causes of the phenomenon. Poor quality of a response is one of the elements of the phenomenon. He said he often responds poorly on requests. Even when the request is a long message, the response will be that short it looks like a text message on a cell-phone. He indicates that answering a request normally does not take longer than a minute, but when it takes longer, it takes much longer to create a

satisfying response. So just like response time, response quality can also go into two directions. The way people respond on his requests is often not satisfying; he is often disappointed in the response he gets. He receives often answers like: “I’ll get back to that” or “You could have known that if you had read the text”. Other issues about e-mail are related to the understanding of a request sent by e-mail; he is experiencing more interpretation difficulties with e-mail then with personal contact; e.g. like on the phone. This because it is hard to add emotions to the message, which can cause a different interpretation then the sender meant with it.

E-mail Client

The respondent does not use his mailboxes lot for task management like described in the literature. He does keep track on tasks sometimes by moving messages towards folders for specific projects.

He does use his mailboxes for personal archiving. Some important data like passwords will be kept in the inbox. He finds it hard to decide what to delete or not. After a while he starts cleaning his inbox massively which can lead to deleting messages that shouldn’t be deleted. In private e-mail he archives different than for business e-mail. When a message is probably continued with further communication flows, he will create a folder for that threat. The first message of that folder contains contact data, to prevent that a contact gets in the contact list; some short-period contacts should not get in the contact list. He has +/- 85 folders and thinks it is maybe too much. Sometime he uses business e-mail for private issues because of the folder option Microsoft Outlook provides. He keeps track on tasks just in his mind, but sometimes he copies a sent request also towards his inbox. He does not think Outlook has to be improved to better support in- and outgoing tasks.

He checks his inbox every time a pop-up appears, but has turned out the sound-signal.

The asynchronous character of e-mail communication has influence on the phenomenon. The respondent thinks that the asynchronous character is an advantage of e-mail. He likes to decide by himself when to answer, other people can’t decide the appropriate time. He has very often peri-synchronous e-mail threats, but peri-synchronous communication as integration in the e-mail client is very undesirable.

Solution 1 (Belotti, Ducheneaut, Howard, & Smith, 2003):

- “Some inboxes are already shared; multiple people can pick up requests out of a single inbox”
- “The proposed system is undesirable”
- “Lack of freedom”
- “It is easy that e-mail doesn’t disappear in the massive inbox”
- “Maybe it’s just a little time getting used to it”
- “There is already plenty of automation”

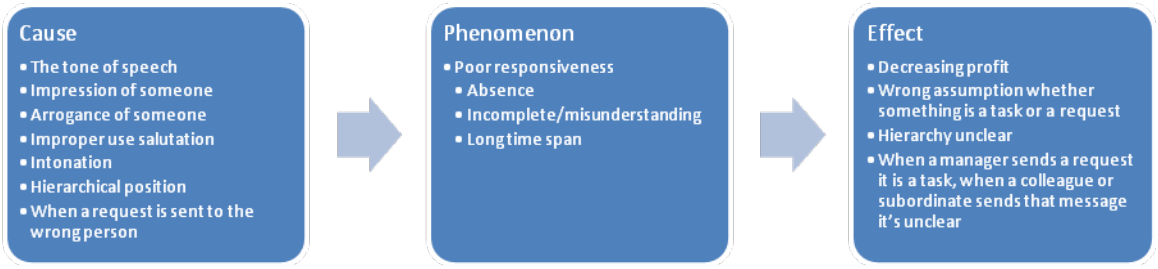
Solution 2 (Scerri, Davis, Handschuh, & Hauswirth, 2009):

- “It is useful for process support”

- "Not unwilling to use"
- "It is handy the system knows what's inside the message"

E-mail in General

The respondent was asked to give three advantages and three disadvantages of e-mail. The advantages were the speed, the indirectness, that it's a silent medium (discrete way of contact), that it's free, and the reach (you can mail everybody). The respondent could only think about two disadvantages: people are using e-mail for too important issues (this feels like an offence) and people are delegating tasks through e-mail. This last disadvantage was interesting because it supports the main research question in the sense that people are moving responsibilities towards others using e-mail. The respondent was explained the "phenomenon" like defined in this thesis, the respondent was asked what he thinks that causes that phenomenon and what its effects are. These results are in the graph below.



The preceding quantitative research

The respondent was confronted with his own results of the preceding quantitative research. He agrees that the results are representing his e-mail behavior and that the average results are probably representing the general e-mail behavior of the organization. The respondent would have preferred to be first interviewed and then performed the test with the research-tool. He didn't like the fact that the tool does not leave the possibility for unethical answers.

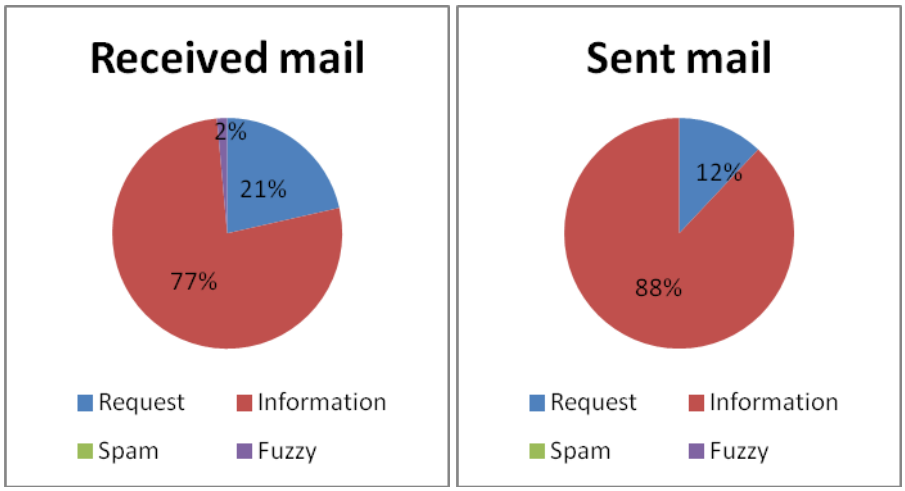
The graphs of this person deviated from the average results of the organization. There is a lot more spam which he receives and sends. This is because every non-business e-mail that passed the filter is marked as spam. Since this person is sending and receiving a lot of amusing e-mails (funny PowerPoint's, images, videos or jokes) from and to colleagues, this is visible in the graph as spam.

Additional commentary of the respondent:

- It would help to organize classes for e-mail usage
- The respondent sends a request again when he gets impatience
- He has experience that he can't get a reaction even after a personal approach
- Positive answering behavior could improve your position
- People working at home use e-mail to send useless messages just to let people see they're really at work, the respondent doesn't respond on that

- When the respondent thinks the message is irrelevant, he wouldn't respond

4.5.2 INTERVIEW 2 – ID 148



GRAPH 7 RESPONDENT 148 (RECEIVED MAIL BASED ON 140 E-MAILS)

E-mail routes and its content

The respondent certainly feels responsible for the continuity of his colleagues; he will always intervene when someone contacts him directly. In the case of e-mail he certainly feels responsibility for responding on e-mail. But in case of busy circumstances it might sometimes take a few days.

The respondent thinks his responding times are at average level; not too slow. The respondent thinks that his responding time could be improved; he got a tip from someone to always answer immediate on incoming requests. The quality of the answers he sends are equal to the quality the answers he receives. On an easy to answer e-mail he writes a very quick answer immediately. The completeness of the answers on his requests is low; often only the first question in the e-mail is answered. He doesn't need any improvements on e-mail communication at all; he thinks it is not worth the effort.

In the sense of alternatives uses of the inbox, he uses it almost never for task-management, but sometimes as reminder, probably three times per year. But he does uses it for archiving, the inbox is an archive, but he doesn't send e-mails to himself. He normally safes the attachments on his pc, but when he doesn't, he uses his inbox as an archive to get the attachment later.

E-mail client

The respondent keeps track on task management in his mind, but some projects have an action list. For task management in cases of requests that are sent by e-mail he said: "it might be easy that I can see for each message in my inbox, whether a reply is required or not".

The respondent has very little experience with peri-synchronous communication.

Solution 1 (Belotti, Ducheneaut, Howard, & Smith, 2003):

- This can have added value to e-mail communication when it is completely automatically and understandable. The progress-bar is undesirable.

Solution 2 (Scerri, Davis, Handschuh, & Hauswirth, 2009):

- When you can see at the outside of the message is a request, this system should be really reliable.
- Maybe this tool could be used for analyzing.

E-mail in general

The respondent was asked to give three advantages and three disadvantages of e-mail. The advantages were that it is a-synchronous, there is a possibility to find back old messages, and it is an easy method to exchange files. The disadvantages were that emotion is hard to estimate; sometimes he thinks the sender is angry, and humoristic content is only suitable to known recipients.

He also never experiences the fact that there is lack of understanding of the content of e-mail.

The respondent was explained the "phenomenon" like defined in this thesis, the respondent was asked what he thinks that causes that phenomenon and what its effects are. These results are in the figure below.

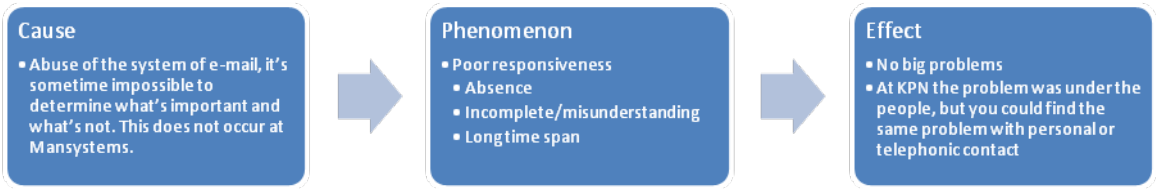


FIGURE 14 CAUSAL RELATION INTERVIEWEE 1

The preceding quantitative research

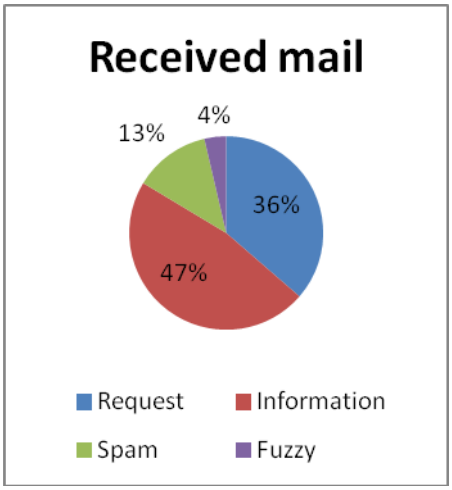
The respondent was confronted with his own results of the preceding quantitative research. He thinks the results are representing his personal e-mail behavior. The average results for the organization were surprising him; he thought there would be more ignored requests. The research was complete according to the respondent. He also finds the two-week time span right of which the questions were asked about.

Additional commentary of the respondent

- Sometimes I have the problem that e-mail is removed by the spam-filter.
- I receive 15-30 messages each day.
- I used to archive in folders, this became problematic since I lost messages in the myriad of folders, therefore I keep all the messages in the inbox and I'll find them using the search function.
- Important messages I mark as unread.
- At KPN, of course a much larger company, I was less likely to respond on requests of unknown people then here.

- I'm less likely to share information with less known colleagues since I don't know whom I am allowed to share which information with.
- I get a lot of e-mails with misspells inside, this agitates me; I'm less likely responding to this kind of e-mail.

4.5.3 INTERVIEW – ID 171



GRAPH 8 RESPONDENT 171 (BASED ON 55 RECEIVED E-MAILS)

There is only one graph available from this person, since the quantitative data lacks data about sent mail.

E-mail routes and its content

Like all the respondents, this respondent feels himself responsible for the continuity of his colleagues. For requests that are sent by e-mail he thinks different about that, the sender stays responsible for the request enclosed in an e-mail. His responding times are at average level depending on how busy he is. The respondent is satisfied of the requests of internal e-mail, e-mail from customers are less complete:" Answers I receive from my colleagues are pretty complete, answers from customers are a bigger problem". The respondent does not know how the responsiveness behavior of his colleagues could be improved.

The respondent does not have a bad experience with the lack of semantic understanding with e-mails towards and from colleagues. Sometimes, when this problem occurs, it can be solved with a single phone call. This is different with e-mails from customers.

E-mail client

The respondent does not use his inbox for task management. He does use his inbox as an archive. He has a special folder for e-mail messages in which he saves important messages, for extremely important messages there is a shared inbox, which can be read by the whole department.

He checks his inbox at randomized times, and has disabled the incoming message sound.

The respondent keeps track on task management in his mind. The software tool which is designed by Mansystems, called ExpertDesk, uses incidents as a task that should be solved. This is also an important task management method. He does not think a personal information management tool could be improved in order to better suit the user in task management.

He does not use e-mail peri-synchronous; when a conversation is getting to be peri-synchronous, he rather uses the telephone. He thinks a chat function would increase the functionality of a personal information management tool. This might be even better then telephone. He uses MSN Messenger for communication with colleagues, especially when working at other locations.

Solution 1 (Belotti, Ducheneaut, Howard, & Smith, 2003):

- "This could be practical; it can even be very practical if everything works automatically."

Solution 2 (Scerri, Davis, Handschuh, & Hauswirth, 2009):

- "I don't think this would work. Workflows should be free."

E-mail in general

Two advantages of e-mail are: the easiness of spreading information, the asynchronous way of communicating ("I'm better concentrated when reading mail instead of having a telephone conversation"). The only disadvantage of e-mail, the respondent could think of, was that too much information can be confusing.

The respondent was explained the "phenomenon" like defined in this thesis, the respondent was asked what he thinks that causes that phenomenon and what its effects are. These results are in the figure below.

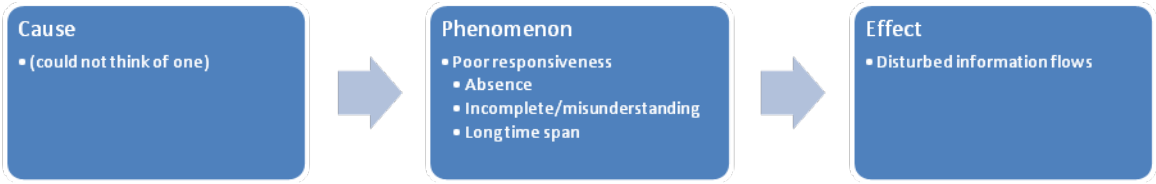


FIGURE 15 CAUSAL RELATION INTERVIEWEE 2

The respondent was also asked how to reduce the phenomenon:

- Making use of phone to correct disturbed e-mail communications
- Having a better overview of whether an e-mail is original or a copy. This would especially be a solution in larger organizations

The preceding quantitative research

He thinks that the quantitative data are representing his e-mail behavior. He does not know the two-week time-span is right:" I can't tell whether the two-week time span is enough, because e-mail activity is fluctuating depending on projects". He thinks the average results are representing the e-mail behavior of the organization. The research is missing some important elements. First the research should be conducted more

often. Second the size of the company is important and cannot be tested, in larger companies more e-mail is ignored.

Additional commentary of the respondent

- Requests per e-mail of which I'm closer involved I'm more likely to reply sooner
- Requests of customers I reply with the message that it is in progress
- The subject is important, I'm more likely to reply on requests that are related to the project of which I'm involved in at that moment
- Every e-mail that I send outside the organization I also CC towards the group's inbox.
- E-mail is more effective in a small organization than in a large organization; in a large organization e-mail is hard to filter.

5 CONCLUSION

The conclusion will cover all four artifacts of the concept of e-mail communication and finishes with the recommendation for a solution for the proposed problem based on this research. The conclusion is based upon the conceptual model, the gathered quantitative data, and the qualitative interview data. The quantitative data can proof whether or not the phenomenon exists in one specific setting and if so, whether there are relations with other independent variables. The interviews will further explore this phenomenon and will provide data to conclude possible causes or effects of the phenomenon, a short exploration of general use of e-mail, possible solutions for the "problem", and data about the validity of the preceding quantitative research.

5.1 THE EXISTENCE OF THE PHENOMENON

The phenomenon is: "The absence, the low quality, incompleteness, or late response on a request sent by e-mail". Of course this phenomenon exists. This can be concluded on lots of data, for instance own experience. Now it can be concluded that this phenomenon exists, the questions arise:

- How often does this happen?
- When it happens, what is the impact on the continuity of the organization or of an individual?
- What causes this phenomenon?
    - How does this behavior change over different e-mail users?
- Can it be reduced or prevented?

These questions can be answered based on the results.

It is very important to mention that these conclusions do not say anything about the overall efficiency and effectiveness of the organization's processes or employees, this conclusion is only about how employees cope with internal communication.

How often does this happen?

The first one is quantitative measureable out of the data. It is not possible to measure low quality or incompleteness, but it is possible to measure the number of requests that got a response and the response time. The first conclusion about this in the described setting is: "*Of all e-mails in this data (which can only be e-mail from colleagues), 24% of them contained a request*". This means the phenomenon can be initiated in 24% of all e-mails received from colleagues. The next conclusion is: "*Of all requests that were sent by e-mail, 6.25% were ignored or forgotten by the receiver*". The data showed 16 ignored requests in 256 of them. Remark that there are other independent variables influencing this, so not "everyone" is ignoring 6.25% of their requests. The literature and the interviews showed a lot of these independent variables, these will be explained later.

Another part of the phenomenon was late response; this can be measured out of both the quantitative data and interview data. This of course only counts when a request actually needs a reply. When someone responds late on a request, the consequences for the receiver could as bad as when the request was ignored. The first conclusion for response time is: "*Based on the respondent's judgment about their own responding behavior; of all requests that needed an answer and were answered, 86.12% were answered within an hour*". The respondents also had to answer on questions on the research about incoming e-mail which were answers on their own requests: "*Based on the respondent's judgment about other's e-mail behavior; of all requests that needed an answer and were answered, 90.1% were answered within an hour*". The conclusion about this difference is: "*The respondents were slightly underestimating their own or overestimating other's responding time*". The qualitative data provided additional data to this. Two interviewees said that their responding times were at average level. One interviewee mentioned he answers always immediately on incoming requests; if not, it could take a week.

Another aspect of the phenomenon is the poor quality of the response; of this, there is no quantitative data available, but there is interview data. All respondents think the quality of their responses equals the responses they get. Two out of three respondents were satisfied about their colleague's quality of the responses. One respondent was disappointed about the quality of the responses, but he also mentioned that he almost always answers with very short messages, like cell-phone messages.

This might indicate more proof for the theory of reciprocity in e-mail behaviors. There is a relation between responding behavior of a person and responding behavior towards that person (Tang & Tyler, 2003). So, the responsiveness image someone has of the sender of a request affects the responding time and response quality of the receiver.

When it happens, what is the impact on the continuity of the organization or of an individual?

What is the impact of an ignored, sent late, or has poor quality? When the phenomenon takes place, the effects might differ highly. The problem on which a request is based could solve itself. A worst-case scenario is that e.g. someone's project is getting stuck, because that person is waiting for a sent request to get done. If the sender assumes the responsibility of that task is now at the side of the receiver, there might appear rigorous consequences for the continuity of the organization.

All interviewees indicated that, if a crucial request is sent with no response in a timely manner, they use the phone or take a visit to the receiver's office to discuss the progress. None of the interviewees indicated they had experience at this organization with major difficulties as result of this phenomenon. Two interviewees mentioned they have a lot experience with this phenomenon at other companies. As a possible explanation, they indicated organization-size as being an important independent variable.

What causes this phenomenon? How does this behavior change over different e-mail users?

This is the most important part of the conclusion because if a solution exists, it has to eliminate the independent variables that cause the phenomenon. The first conclusion is: *"There is a relation between company size and the occurrence of the phenomenon*". Since the quantitative data only covers one organization, it is impossible to ground this conclusion. The interview data gave more proof for this, one respondent said: "At KPN, of course a much larger company, I was less likely to respond on requests of unknown people then here". At Mansystems everybody knows each other. In case someone does not know the sender of a request and ignores or forgets the request, the sender does not know where someone is sitting in the building or how someone looks like; this eliminates alternative solutions like visiting or reduces the change of calling the receiver on the phone. Another respondent which also has experience at a large company said: "Requests per e-mail of which I'm closer involved I'm more likely to reply sooner". The likelihood someone receives e-mail related to situations someone is less closely involved in is higher in larger organizations then in smaller organizations.

The second conclusion is: "*There is a relation between the hierarchical position (of the sender and of the receiver) and the occurrence of the phenomenon*". One interviewee indicates that when his manager sends him a request, he knows he is now responsible for it, when a subordinate or someone on the same hierarchical level sends a request, he does not know who is responsible for it. Though: "*All respondents feel responsible for the continuity of their colleagues whenever it is in their possibilities to involve*". So, if this influences the phenomenon, this should occur more at management level then at low hierarchical level; because management only receive a small amount of requests from higher levels. There is no quantitative data from the management, because they were too busy to attend this research. As indicated earlier, the quantitative data, which does not contain management results, showed no significant presence of this phenomenon.

The initial statement was: "There are shortcomings associated with the transparency in responsibilities for communication through e-mail". This assumption causes e-mail users not to know whether they are responsible for answering on or executing incoming requests by e-mail or not. Which in turn might cause that someone who gets a request thinks he is not responsible which causes the request to remain undone. The interview data showed that there are indeed shortcomings associated with the transparency in responsibilities concerning requests that are sent by e-mail. Two interviewees indicated the receiver was responsible, one indicated the sender was responsible. Although these low numbers can't be generalized to a larger group, it will proof there is uncertainty about who is responsible.

"*A receiver of a request is less likely to respond when he remarks the request is sent towards multiple recipients."* There are multiple reasons why someone sends a request towards multiple receivers. One of them could be that the sender thinks the request is more likely to be answered on when more people receive it, a counter effect is that the receivers think their colleagues are already dealing with it. This is a typical case of blurred awareness of responsibility. Based on a sample of 8.596 e-mail messages it can be concluded that: "*51,7% of*

all e-mail messages were sent to multiple recipients, both in the to-field as in the cc-field", "*67,4% of all e-mail messages were sent to only one recipient in the to-field*", "*The average number of recipients is 2,67 using just the to-field and 3,94 using the to-field as well as the cc field*". These messages do not have to contain a request, but it indicates that if this also causes the phenomenon, the blurry awareness of responsibility can be caused by the multiple recipients of a request.

5.2 REDUCING OR PREVENTING THE PHENOMENON

If the phenomenon can be reduced or maybe prevented, it can be both with or without changing the PIM(Personal Information Management Tool). In the literature, two adaptations of the e-mail client and peri-synchronous usage of e-mail were described. Peri-synchronous usage of e-mail does not require changes to the PIM, but a PIM could be adapted to make communicating more synchronous. Situations without change of the PIM have to give users restrictions, pre-designed workflows, or classes for usage of e-mail. After that, a general conclusion is given about a possible solution based on elimination of independent variables that might cause the phenomenon.

First, reducing the phenomenon with changes of the PIM. Both adaptations are shortly summarized, better descriptions can be found in chapter 2.4.2 and 2.4.3. The first discussed adaption of the PIM was of Belotti, Ducheneaut, Howard, and Smith and published in 2003. This was a new layer over Microsoft Outlook, the Taskmaster. This adaption of Outlook could group several items, in general tasks, together based on e.g. a specific project. This "project" in the list shows, how many tasks of it still needs to be done by the user or by another user. This adaption also made it possible to see the progress of all tasks connected to that specific project.

The first interviewee said this system is not wishful. "It decreases freedom of the e-mail user." "There are already shared inboxes where all tasks are in." He does think it makes sense the e-mail will not flow down in the inbox, so you are less likely to forget something. "Maybe, you just have to get used to it for a while." He also thinks that there are already enough things getting automated. Two other interviewees are enthusiastic about this. They said it would have added value if it is understandable and will work automatically. One of the second two interviewees mentioned that the progress bar would be unpleasant.

The second adaption of e-mail was of Scerri, Davis, Handschuh, and Hauswirth, published in 2009. This adaption was a more sophisticated. This solution added semantics to e-mail and made it now possible to add workflows to e-mail. This software was able to "read" e-mail messages in order to find out what process belongs to each speech act(e.g. a request) was needed. The receiver has an overview of what needs to be done and answering is made easy since every sentence is clickable to respond while reading the message.

The first interviewee mentioned that this solution might be useful to support the workflow with this software. "I'm not negative about this solution." It is useful that the system knows what is inside the message.

The second interviewee hardly trusts the reliability when the software is automatically recognizing the content. The third interviewee total rejects this method. “The workflow of e-mail needs to stay free!”

People are sometimes using e-mail as if they are “chatting”, they answer an e-mail immediate, and that answer is then answered immediate. When this happen a few time after each other, e-mail is getting peri-synchronous (Tang & Tyler, 2003). Maybe there should be an integration in the PIM to enhance this method of communication. One respondent does not have a lot of experience with this way of communicating. The other two do not like this way of communicating. The a-synchronous character of e-mail is an advantage. One of the interviewees has a lot of experience with this, especially when there are multiple people involved in the to- or cc-field; this, he thinks, is very undesirable. One of the interviewees is using the Microsoft Messenger, a synchronous way of electronic communication. This is used through the whole department especially when working at other locations.

The conclusion: *“This phenomenon can be reduced with adapting the PIM, but there is no one best way of doing this. Based on the interview data, different users appreciated different adaptations; these adaptations were controversial. It is not possible to integrate all kind of improvements, to enhance the usage of e-mail, which in turn will not all be used by the e-mail users. This will be at cost of e-mail’s simplicity which always was the power of its success.”*

Can the phenomenon be reduced or maybe prevented without changing the PIM? This is possible by building an e-mail policy and training people for using e-mail properly. One of the interviewees suggested to organize classes for e-mail usage. What would be a good strategy for using e-mail to teach in those classes? The phenomenon can be reduced by improving the way people use e-mail, a way that reduces the effect of the independent variable that causes the phenomenon.

Independent variables that causes the phenomenon:

- Unawareness of responsibility
    - Caused by the number of recipients of a request
    - Caused by the hierarchical position of the sender
    - Caused by not or poorly knowing the sender

There is, at least at Mansystems, no policy for responsibility in the sense of requests that are sent by e-mail. Because there is no policy there is no transparency in this. E-mail users are now unaware whether they are responsible or not for an incoming request. Designing a policy, in the field of how to deal with incoming requests, could turn responsibility into accountability. This means that the “abuse” of e-mail, e.g. for pushing of responsibilities towards others, can be taken into someone’s appraisal.

A good policy for this has to be specially designed for each specific situation. It will depend on the organization’s structure; e.g. in a centralized organization it should be less easy to push responsibilities towards other then in a de-centralized organization. There is no one best way of building policy that fits into all organizations.

6 DISCUSSION

Is the method of quantitative research a proper way of assessing the phenomenon?

The method of quantitative research with the special developed research tool is a proper "start" of assessing the phenomenon, the research tool has some major issues which has to be improved in case of further research. The download method, the tool uses for gathering e-mail data from the respondent's mailboxes, only downloads e-mail from the inbox; e-mails that are moved towards other folders will not be taken into the research. This causes that some respondents were not able to participate into the quantitative research. When this research is conducted again, this issue should be solved. Despite this, still many quantitative data was gathered which definitely proofs the power of this method. This method could produce many measurable data in a short amount of time with less effort; it took users approximately 15-20 minutes to participate. Another issue is the two-week time span of the e-mails of which the questions were about. Interview data showed that e-mail users have very fluctuating e-mail amounts; some weeks there are a lot more e-mails then other weeks. It is not possible to let the respondents answer questions about e-mails that are e.g. received more than a month ago, the respondent does not remember how he dealt with e.g. an incoming request; this might cause that the data is invalid.

Are the quantitative results representing the organization's e-mail behavior?

The results are probably representing the e-mail behavior of the organization. The phenomenon does rarely occur at the organization, but that can only be considered as good news. The quantitative data is missing the relation between the occurrence of the phenomenon and its effect. E.g., an e-mail user might ignore 100 requests a year but it can be possible it causes almost no problems for the organization's continuity, but an e-mail user can ignore one e-mail, which causes a whole project to get stuck. There is a rumor of a manager from another organization which found over 600 e-mails in his inbox when he got back of his holidays, instead of reading, and if necessary replying, the e-mails, he removed them all and got only reminders of two of them.

What else could be improved to the quantitative research?

The quantitative data is representing the e-mail behavior of one organization and has proofed the phenomenon is poorly occurring in this setting. The qualitative interview data proofed also the phenomenon is poorly occurring at this setting but the interviewees all indicated the phenomenon does occur a lot more often in larger organizations. If the quantitative research can be done again in a much greater organization, the independent variable "company size" could be measured. This because the interview data proofed that e-mail users are less likely to respond on requests they receive from people they don't know then from people they do know. Maybe, the independent variables of organizational culture can also be measured and compared to other organizations.

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7.1 FIGURES

7.2 TABLES

7.3 GRAPHS

8 REFERENCES

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Babbie, E. (2007). *The Practice of Social Research 11th Edition.* Belmont: Thomson.

Belotti, V., Dalal, B., Good, N., Flynn, P., Bobrow, D. G., & Ducheneaut, N. (2004). What a T-Do: Studies of Task Management Towards the Design of a Personal Task List Manager. *CHI* , 735-742.

Belotti, V., Ducheneaut, N., Howard, M., & Smith, I. (2003). Taking Email to Task: The Design and Evalutation of a Task Management Centered Email Tool. *CHI* , 345-352.

Cross, R., Parker, A., Prusak, L., & Borgatti, S. P. (2001). Knowing What We Know: Supporting Knowledge Creation and Sharing in Social Networks. *Organizational Dynamics* , 100–120.

Dabbish, L. A., & Kraut, R. E. (2006). Email Overload at Work: An Analysis of Factors Associated with Email Strain. *CSCW* , 431-440.

Dabbish, L. A., Kraut, R. E., Fussel, S., & Kiesler, S. (2005). Understanding Email Use: Predicting Action on a Message. *CHI* , 691-700.

Ducheneaut, N., & Bellotti, V. (2001). E-mail as Habitat. *Interactions* , 30-38.

Freeman, L. (1979). Centrality in Social Networks Conceptual Clarification. *Elsevier Sequoia S.A.* , 215-239.

Scerri, S., Davis, B., Handschuh, S., & Hauswirth, M. (2009). Semanta - Semantic Email made Easy. *Springer-Verslag Berlin Heidelberg* , 37-50.

Scerri, S., Handschuh, S., & Decker, S. (2008). Semantic Email as a Communication Medium for the Social Semantic Desktop. 124-138.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and Quasi-Experimental Designs for Generalized Causel Inference.* Boston: Houghton Mifflin Company.

Tyler, J. R., Wilkinson, D. M., & Huberman, B. A. (2004). E-Mail as Spectroscopy: Automated Discovery of Community Structure within Orginizations. *Taylor & Francis* , 133-141.

Voorhoeve, M., & van der Aalst, W. (1997). Ad-hoc Workflow: Problems and Solutions. *Eindhoven University of Technology* , 36-40.

Whittaker, S., & Sidner, C. (1996). Email overload: exploring personal information management of email. *CHI* , 276-283.

8.2 CONCEPT MATRIX

Concept Matrix

	Speech act theory	Ad-hoc workflows	E-mail overload	Inbox organization	Task management	Research inbox by hand	Kappa statistics	Ontology	File transfer	Usage where it's not designed for	Social network analysis	Inbetweenness centrality	Concept maps	Research methodology	Peri-synchronous communication	Response expectation
Babbie, E. (2007). The Practice of Social Research 11th Edition. Belmont, Thomson.															x	
Bälter, O. (2000). Keystroke level analysis of email message organization, ACM.				x												
Belotti, V., N. Ducheneaut, et al. (2003). "Taking Email to Task: The Design and Evalu					x	x		x								
Cohen, W., V. Carvalho, et al. (2004). Learning to classify email into "speech acts".	x			x	x	x	x	x								
Cross, R., A. Parker, et al. (2001). "Knowing What We Know: Supporting Knowledge											x					
Dabbish, L. A. and R. E. Kraut (2006). "Email Overload at Work: An Analysis of Factors			x	x	x											
Ducheneaut, N. and V. Bellotti (2001). "E-mail as Habitat." Interactions: 30-38.			x	x						x	x					
Freeman, L. C. (1979). "Centrality in Social Networks Conceptual Clarification." Elsev												x	x			
Hackman, R. J., L. E. Jones, et al. (1967). "A set of dimensions for descriving the gene																
Novak, J. S. and A. J. Cañas (2008). "The Theory Underlying Concept Maps and How t														x		
Scerri, S., B. Davis, et al. (2009). "Semanta - Semantic Email made Easy." Springer-Ve	x	x						x								
Scerri, S., S. Handschuh, et al. (2008). "Semantic Email as a Communication Medium	x	x						x								
Shadish, W. R., T. D. Cook, et al. (2002). Experimental and Quasi-Experimental Desig															x	
Tyler, J. and J. Tang (2003). When can I expect an email response? A study of rhythm							x									x
Tyler, J. R., D. M. Wilkinson, et al. (2004). "E-Mail as Spectroscopy: Automated Disco																
Voorhoeve, M. and W. van der Aalst (1997). "Ad-hoc Workflow: Problems and Solut		x														
Whittaker, S. and C. Sidner (1996). "Email overload: exploring personal information																

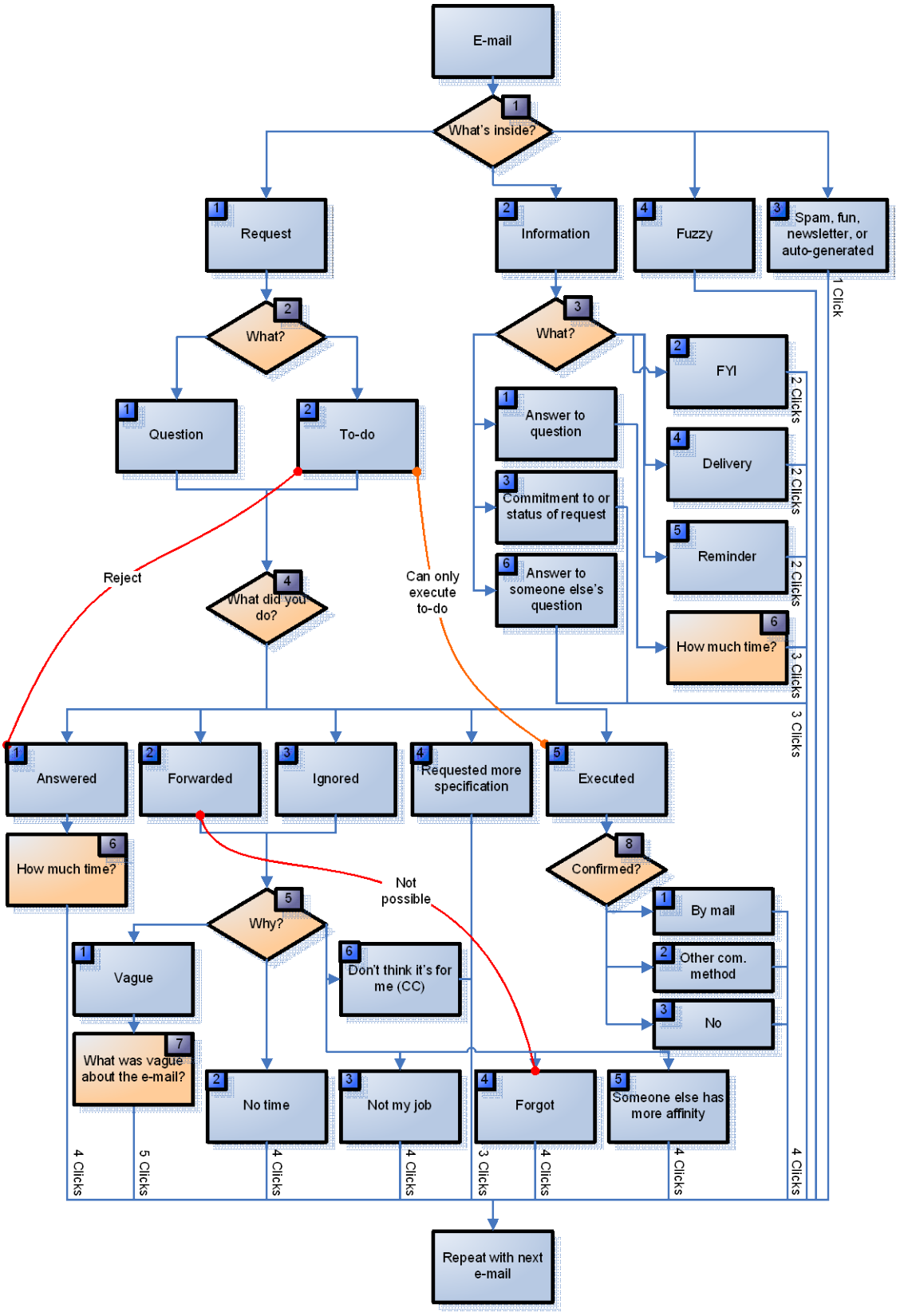
9 APPENDIX

Next pages contain the appendixes.

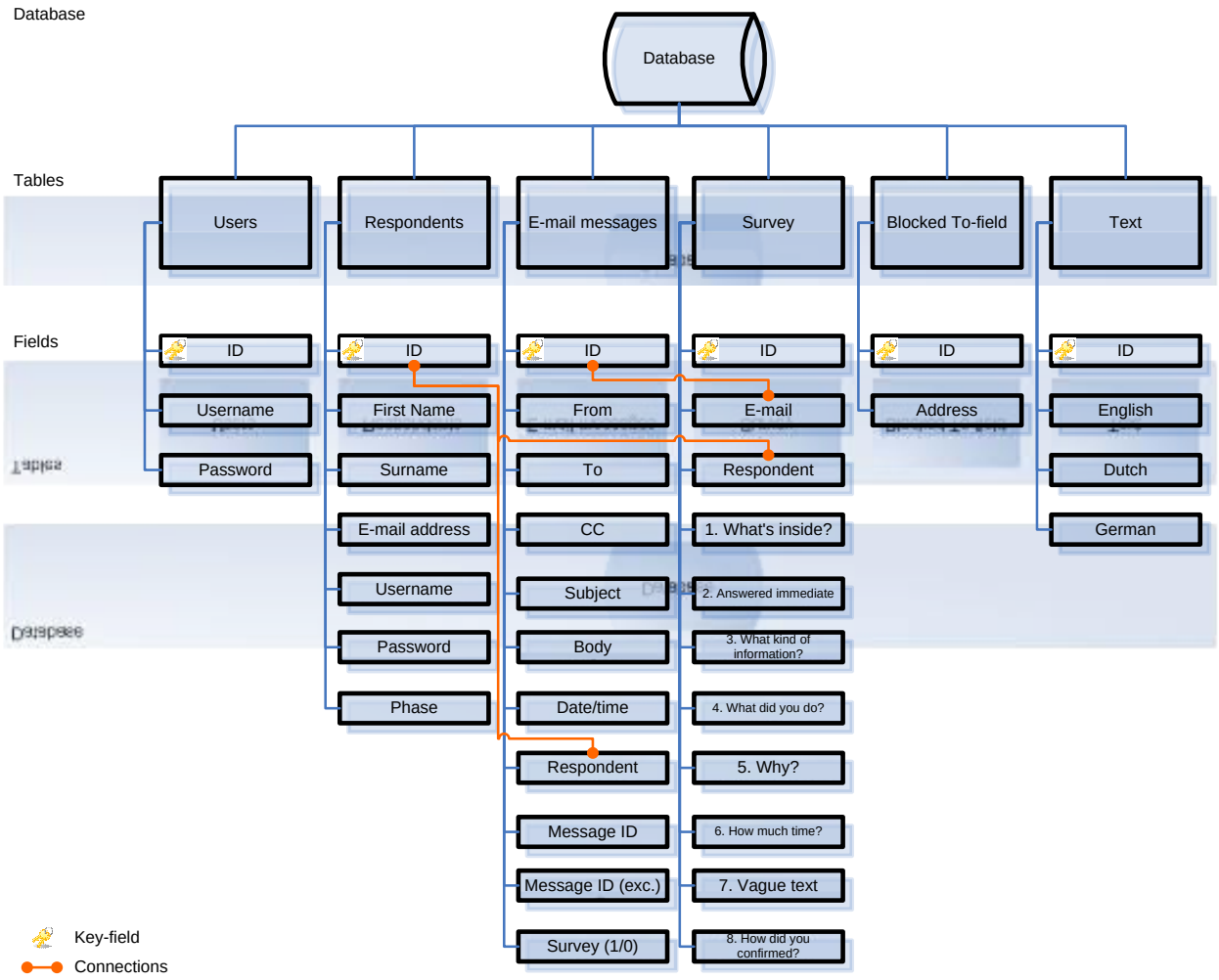
9.1 ALL RESULTS FROM THE E-MAIL SURVEY

								Request Question						Request To-do									Ignored Request							Delay time																		Information					
																													My answer to other's question									Someone else's answer to my question														
Respondent	Avg mail/week	#survey questions	Request	Information	SPAM	Fuzzy	%Request	#	Answered	Forwarded	Ignored	Request more spec.	%Answered	#	Answered	Forwarded	Ignored	Request more spec.	Executed	% Executed	%Question	%To-do	#	Vague	No time	Not my job	Forgot	Someone else more affinity	Don't think it's for me	Direct	<Hour	half a day	a day	few days	week	>week	Direct	<Hour	half a day	a day	few days	week	>week	Answer to my question	FYI	Commitment or status of request	Delivery	Reminder	Answer to someone else's question
148	-	140	30	108	0	2	21,7%	**24**	22	0	1	0	92%	**7**	5	0	0	0	2	29%	80%	23%	**1**	0	0	0	0	0	1	19	5	3	0	0	0	0	45	14	1	0	0	1	0	61	21	3	8	0	15
56	76,00	100	18	69	1	12	20,7%	**15**	14	0	1	0	93%	**3**	0	0	0	0	3	100%	83%	17%	**1**	0	0	1	0	0	0	3	7	4	0	0	0	0	7	4	0	0	0	0	0	11	53	0	3	0	2
102	56,90	87	25	58	0	4	30,1%	**15**	14	0	0	0	93%	**11**	2	0	0	1	8	73%	60%	44%	**0**	0	0	0	0	0	0	11	5	0	0	0	0	0	13	3	1	0	0	0	0	17	35	2	3	0	1
80	72,73	66	18	36	1	11	33,3%	**12**	8	1	3	0	67%	**6**	0	0	0	0	6	100%	67%	33%	**3**	0	0	0	0	1	3	6	2	0	0	0	0	0	8	3	0	0	0	0	0	11	20	3	0	0	2
50	79,90	63	17	30	11	5	36,2%	**8**	7	0	0	1	88%	**9**	1	0	0	0	8	89%	47%	53%	**0**	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	1	0	0	0	0	1	26	2	0	1	0
98	14,14	56	17	27	12	0	38,6%	**9**	5	0	3	0	56%	**9**	7	1	0	0	1	11%	53%	53%	**3**	0	3	1	0	0	0	5	5	0	0	0	1	1	4	2	2	1	0	0	0	9	16	0	0	0	2
171	27,86	55	20	26	7	2	43,5%	**8**	7	0	0	0	88%	**13**	3	0	3	0	7	54%	40%	65%	**3**	0	3	0	0	0	0	4	5	1	0	0	0	0	2	1	0	0	0	0	0	3	20	0	1	1	1
105	115,80	51	10	41	0	0	19,6%	**11**	10	0	0	0	91%	**0**	0	0	0	0	0		110%	0%	**0**	0	0	0	0	0	0	0	4	4	2	0	0	0	4	5	2	1	0	0	0	12	22	2	0	0	5
96	100,75	43	7	31	5	0	18,4%	**3**	3	0	0	0	100%	**4**	0	1	1	1	1	25%	43%	57%	**1**	0	0	1	1	0	0	1	1	1	0	0	0	0	0	1	0	0	1	0	0	2	29	0	0	0	0
47	102,50	41	17	16	4	4	51,5%	**12**	9	1	0	1	75%	**6**	3	0	0	0	3	50%	71%	35%	**0**	0	0	1	0	0	0	6	2	2	1	0	0	1	0	3	1	0	0	0	0	4	9	1	1	0	1
101	150,00	38	15	19	2	2	44,1%	**10**	8	0	2	0	80%	**5**	1	0	0	0	4	80%	67%	33%	**2**	0	0	0	0	0	2	4	5	0	0	0	0	0	3	1	0	0	0	0	0	4	13	0	0	0	2
140	7,21	36	7	28	0	1	20,0%	**5**	5	0	0	0	100%	**3**	0	0	0	0	3	100%	71%	43%	**0**	0	0	0	0	0	0	1	3	0	0	0	0	0	5	1	0	0	0	0	0	6	19	0	0	2	1
163	81,00	33	1	21	11	0	4,5%	**1**	1	0	0	0	100%	**0**	0	0	0	0	0		100%	0%	**0**	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	3	13	2	2	0	1
21	63,11	32	21	9	2	0	70,0%	**3**	3	0	0	0	100%	**18**	15	0	0	0	3	17%	14%	86%	**0**	0	0	0	0	0	0	7	10	1	0	0	0	0	1	2	0	0	1	0	0	4	3	1	1	0	0
110	44,17	32	3	27	2	0	10,0%	**3**	3	0	0	0	100%	**0**	0	0	0	0	0		100%	0%	**0**	0	0	0	0	0	0	0	2	0	1	0	0	0	0	4	0	0	0	0	0	0	4	15	5	0	2	1
75	16,17	31	1	30	0	0	3,2%	**1**	1	0	0	0	100%	**0**	0	0	0	0	0		100%	0%	**0**	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	0	0	0	1	0	0	6	5	2	0	1	16
97	11,00	31	4	27	0	0	12,9%	**2**	1	0	0	0	50%	**3**	0	0	0	0	3	100%	50%	75%	**0**	0	0	0	0	0	0	1	0	0	0	0	0	0	1	6	0	0	0	0	0	7	7	5	5	2	1
146	30,88	31	4	25	1	1	13,8%	**4**	3	0	0	0	75%	**1**	0	0	0	0	1	100%	100%	25%	**0**	0	0	0	0	0	0	1	2	0	0	0	0	0	8	4	0	0	0	0	0	12	12	0	0	1	0
69	6,50	23	5	18	0	0	21,7%	**5**	5	0	0	0	100%	**0**	0	0	0	0	0		100%	0%	**0**	0	0	0	0	0	0	0	3	2	0	0	0	0	0	3	2	0	0	0	0	0	5	8	0	2	3	0
11	9,75	21	6	6	3	6	50,0%	**2**	2	0	0	0	100%	**5**	2	0	0	0	2	40%	33%	83%	**0**	0	0	0	0	0	0	2	2	0	0	0	0	0	2	2	0	0	0	0	0	4	1	0	0	0	1
27	46,78	18	0	8	5	5	0,0%	**0**	0	0	0	0		**0**	0	0	0	0	0				**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2	3	1	1	1	0
35	3,82	12	1	11	0	0	8,3%	**0**	0	0	0	0		**1**	0	0	0	0	1	100%	0%	100%	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	7	2	1	0	0
48	21,53	6	0	6	0	0	0,0%	**0**	0	0	0	0		**0**	0	0	0	0	0				**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	1	1
133	2,00	5	3	2	0	0	60,0%	**1**	1	0	0	0	100%	**2**	1	0	0	0	1	50%	33%	67%	**0**	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0
120	4,67	4	1	3	0	0	25,0%	**0**	0	0	0	0		**1**	0	0	0	0	1	100%	0%	100%	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2	0	0	0	0
137	4,50	3	2	1	0	0	66,7%	**2**	1	0	1	0	50%	**0**	0	0	0	0	0		100%	0%	**1**	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
95	2,17	2	1	1	0	0	50,0%	**2**	1	0	0	0	50%	**0**	0	0	0	0	0		200%	0%	**0**	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
62	1,60	1	1	0	0	0	100,0%	**0**	0	0	0	0		**1**	0	0	0	0	1	100%	0%	100%	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	8,33	1	1	0	0	0	100,0%	**0**	0	0	0	0		**1**	0	0	1	0	0	0%	0%	100%	**1**	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199		1062	256	684	67	55	32%	0	158	134	2	11	2	81%	109	40	2	5	2	59	64%	63%	45%		15	0	8	4	1	1	5	86	63	17	4	0	1	2	117	56	11	3	3	2	0	192	363	33	28	15	53

9.2 RECURRING PROCESS FOR THE E-MAIL SURVEY



9.3 ARCHITECTURAL DESIGN DATABASE FOR THE RESEARCH TOOL



9.4 TRANSCRIPTS INTERVIEWS

√ = Data already gathered with the quantitative research tool

1. About usage of e-mail
    a. How many e-mail messages do you receive each day? √
    b. How many of them need to be replied by you? √
    c. How many of these messages contain tasks/to-dos? √
    d. How much time do you take to reply on e-mails of which you know the answer immediately? √
2. About feeling of responsibility
    a. Do you feel responsible for the continuousness of you colleague whenever it is in your possibilities to involve?

    - The respondent feels himself responsible for the continuity of his college's processes when he is able to involve

    - It depends on whether he likes that person or not

    - He feels more responsible for processes of his manager then for the processes of colleagues of the same hierarchical level or subordinates.

    - He finds himself responsible for received tasks until he decided not to act upon received requests

3. About someone's feeling of responsibility towards e-mail communication and its relations towards e-mail effectiveness
    a. Does someone feel responsibility for responding on an e-mail (or the execution of an enclosed task) in general? (Explanatory/ quantitative)
    b. Response time
        i. How much time do you take to respond on an easy-to-answer question? (Easy to answer is: short answer without having to find out something) √
        ii. How much time do you approximately take to respond on a question? (Find out awareness using comparison mailbox and answer) √

iii. Do you think your respond times are above or below average responding times? (Qualitative)	- The respondent thinks he responds directly upon e-mail, the quantitative data can supports that that - When is taking more time, it takes a lot more time, sometime a week or not at all -
iv. Do you think your respond times are too slow? (Qualitative)	The respondent considers himself as a quick responder, he also answers messages in the evening or in the evening
v. Do you think your respond times could be improved? (Qualitative)	- More use of the high importance-indicator - Combine it with other communication methods, like the phone - Not change the e-mail client - Reduce impersonality - Do not use e-mail for important issues, personal contact will be more effective - He uses "not answering" as a punishment for what he believes as improper usage of e-mail - He uses "forwarding" also as punishment - He forwards requests to colleagues and makes it look like a pleasant job to do
vi. How could response time be improved? (Qualitative)	n/a

c. Response Quality

i. How do you think the quality of the answers you send relate to the answers that are sent to you?	He sends messages with poor content, like the short messaging function on cell phones. Even though a colleague sends a long message, the response is short. His short message will be extra explained vocal afterwards to compensate the short message.
ii. How much time do you spend writing a response an easy-to-answer question? (Easy to answer is: short answer without having to find out something)	√ < one minute, otherwise a lot longer time

iii. Measurement: size question vs. reply?

Difficultness of question positively relates to time to answer

- Short question, short answer

- Depends on formality , like whether is from a colleague or a customer

- When he wants to get done with it, he makes a long answer with as much as possible details

- Sometime while typing an answer, he suddenly decides it's better to call

iv. When you send a mail with question(s) how do you consider the average completeness of the answer? (10-100%)

- Often disappointed in the answer

- Often answers like: "I'll get back to that" or "You could have know that if you had read the text"

v. How do you think your satisfaction about the way your mail is replied could be increased? (Qualitative)

4. About usage of mailbox (Whittaker & Sidner, 1996)

a. Do you use your mailbox for task management? (Likert scale)

How? Not often, but sometimes in a folder with current projects

b. Do you use your mailbox for personal archiving? (Likert scale)

Yes, like an archive. Some important data like passwords will be kept in the inbox.

- Hard to decide what to delete or not
- After a while he starts cleaning his inbox massively which can lead to deleting messages that shouldn't be deleted
- In private accounts he uses this different than for business accounts

c. Do you use your mailbox for a-synchronous communication? (Likert scale)

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d. How many folders do you have to file your e-mail? (Quantitative explorative)

When a message is probably continued with further communication flows, he will create a folder for that threat. First message of that folder contains contact data, to prevent that a contact gets in the contact list; some short-period contacts should not get in the contact list.

	+/- 85 folders, maybe too much Sometime business e-mail usage for private issues because of the folder option
e. When do you check your inbox	Every time the e-mail icon appears. Sounds are shut down.
5. The management of tasks	
a. How do you keep track on your outgoing tasks? (Explanatory/Qualitative)	Keep it in mind. Sometimes sent messages copied to inbox
b. How could a personal information management tool be improved in order to give a better overview of in- and outgoing tasks? (Qualitative)	Does not have to
6. The asynchronous character of e-mail communication gives users the freedom to respond on an e-mail whenever they like to, do you think there a way to have this way of communication more synchronous? (Explorative/ qualitative) Do you use e-mail peri-synchronous sometimes?	- The a-synchronous character is an advantage of e-mail. - Likes to decide by himself when to answer, other people can't decide the appropriate time - Very often peri-synchronous e-mail threats, but peri-synchronous communication as integration in the e-mail client is very undesirable
7. Attempts to improvements of e-mail	
a. Belotti, Ducheneaut, Howard, & Smith 2003	
i. Although this solution does not solve the lack of delegation of responsibility, do you think this has still this same amount of influence on the lack responsiveness on sent questions after implementation of the software?	- Some inboxes are already shared, multiple people can pick up requests out of a single inbox - Proposes system is undesirable - Lack of freedom - It is easy that e-mail doesn't disappear in the massive inbox - Maybe it's just a little time getting used to it - There is already plenty of automation
b. Scerri, Davis, Handschuh, & Hauswirth 2009	
i. Although this solution does not solve the lack of delegation of responsibility, do you think this has still this same amount of influence on the lack responsiveness on sent questions after implementation of the software?	- It is useful for process support - Not unwilling to use - It is handy the system knows what's inside the message
8. Representativeness quantitative research	
a. Do you think your results are representing you e-mail behavior?	The results are representing the responsiveness behavior, the ratios are right also

b. Do you think the results are representing the average e-mail behavior in this company?	This is probably representing the average behavior
c. Do you think the survey is missing some important measureable elements about e-mail communication?	- The respondent would have preferred to be first interviewed and then performed the test with the research-tool - The tool does not leave the possibility for unethical answers
9. About E-mail in general	
a. Can you explain three or more advantages of e-mail?	- The speed - Not direct - Silent medium, discrete way of contact - Free - The reach of people; you can mail averybody
b. Can you explain three or more disadvantages of e-mail?	- People are using e-mail for too important issues, this feels like an offence - People are delegating tasks
10. Semantic understanding	
a. Do you have experience with incompleteness of questions or other vague requests? E.g., you considered an e-mail as being just information but it turned out this was actually a request.	He is experiencing more interpretation difficulties with e-mail then with personal contact; e.g. like on the phone.
11. Phenomenon	
a. What do you think that causes the phenomenon?	- Tone of speech - Impression of someone - Arrogance of someone - Improper use salutation - Intonation - Hierarchical position - When a request is sent to the wrong person
b. Where do we need to look for a solution? (possible independent variables)	Already said in previous answer
c. What do you think that are the effects of the phenomenon?	- Decreasing profit - Wrong assumption whether something is a task or a request - Hierarchy unclear - When a manager sends a request it is a task, when a colleague or subordinate sends that message it's unclear
12. To-do's that are answered	
a. When you have answered a to-do, have you finished the task?	This was indeed a vague item, an answered to-do could also mean that the receiver sends a message that he starts executing it.

9.4.1 INTERVIEW 1

Extra notes:

- It would help to organize classes for e-mail usage
- The respondent sends a request again when he gets impatience
- He has experience that he can't get a reaction even after a personal approach
- Positive answering behavior could improve your position
- People use e-mail sometime to slobber
- People working at home use e-mail to send useless messages just to let people see they're really at work, the respondent doesn't respond on that
- When the respondent thinks the message is irrelevant, he wouldn't respond

9.4.2 INTERVIEW 2

1. About usage of e-mail	
a. How many e-mail messages do you receive each day?	√
b. How many of them need to be replied by you?	√
c. How many of these messages contain tasks/to-dos?	√
d. How much time do you take to reply on e-mails of which you know the answer immediately?	√
2. About feeling of responsibility	
a. Do you feel responsible for the continuousness of you colleague whenever it is in your possibilities to involve?	I certainly feel myself responsible for the continuousness of my colleagues, I will always intervene when someone contacts me directly.
3. About someone's feeling of responsibility towards e-mail communication and its relations towards e-mail effectiveness	
a. Does someone feel responsibility for responding on an e-mail (or the execution of an enclosed task) in general? (Explanatory/ quantitative)	I certainly feel responsibility for responding on e-mail. But in case of busy circumstances it might sometimes take a few days.
b. Response time	
i. How much time do you take to respond on an easy-to-answer question? (Easy to answer is: short answer without having to find out something)	√
ii. How much time do you approximately take to respond on a question? (Find out awareness using comparison mailbox and answer)	√
iii. Do you think your respond times are above or below average responding	I think my response time is average

times? (Qualitative)	
iv. Do you think your respond times are too slow? (Qualitative)	I think my response time is not too slow
v. Do you think your respond times could be improved? (Qualitative)	
vi. How could response time be improved? (Qualitative)	Someone gave me a tip to answer incoming e-mails immediate
c. Response Quality	
i. How do you think the quality of the answers you send relate to the answers that are sent to you?	Fine, this is equal towards each other
ii. How much time do you spend writing a response an easy-to-answer question? (Easy to answer is: short answer without having to find out something)	√ Directly
iii. Measurement: size question vs. reply?	
iv. When you send a mail with question(s) how do you consider the average completeness of the answer? (10-100%)	Some people only answer the first question in an e-mail
v. How do you think your satisfaction about the way your mail is replied could be increased? (Qualitative)	Keep it like the way it is, is it worth the effort?
4. About usage of mailbox (Whittaker & Sidner, 1996)	
a. Do you use your mailbox for task management?	No, but sometimes as reminder, probably three times per year.
b. Do you use your mailbox for personal archiving?	Of course, the inbox is an archive, but I don't send e-mails to myself. I normally safe the attachments on my pc, but when I don't, I use my inbox as an archive to get the attachment later.
c. Do you use your mailbox for a-synchronous communication?	X
d. How many folders do you have to file your e-mail? (Quantitative explorative)	No folders
e. When do you check your inbox	X
5. The management of tasks	
a. How do you keep track on your outgoing tasks? (Explanatory/Qualitative)	In my mind, but some projects have an action list

b. How could a personal information management tool be improved in order to give a better overview of in- and outgoing tasks? (Qualitative)	It might be easy that I can see for each message in my inbox, whether a reply is required or not.
6. The asynchronous character of e-mail communication gives users the freedom to respond on an e-mail whenever they like to, do you think there a way to have this way of communication more synchronous? (Explorative/ qualitative) Do you use e-mail peri-synchronous sometimes?	I have some experience with this way of communicating, but not often
7. Attempts to improvements of e-mail	
a. Belotti, Ducheneaut, Howard, & Smith 2003	
i. Although this solution does not solve the lack of delegation of responsibility, do you think this has still this same amount of influence on the lack responsiveness on sent questions after implementation of the software?	- This can have added value to e-mail communication when it completely automatically and understandable. The progress-bar is undesirable.
b. Scerri, Davis, Handschuh, & Hauswirth 2009	
i. Although this solution does not solve the lack of delegation of responsibility, do you think this has still this same amount of influence on the lack responsiveness on sent questions after implementation of the software?	- When you can see at the outside of the message is a request, this system should be really dependable. Maybe this tool could be used for analyzing.
8. Representativeness quantitative research	
a. Do you think your results are representing you e-mail behavior?	Yes I think so
b. Do you think the results are representing the average e-mail behavior in this company?	I expected more ignored requests
c. Do you think the survey is missing some important measureable elements about e-mail communication?	I think it is complete, the two weeks of time span were also right.
9. About E-mail in general	
a. Can you explain three or more advantages of e-mail?	- A-synchronous - Possible to find back old messages - Easy method to exchange files
b. Can you explain three or more disadvantages of e-mail?	- Emotion hard to estimate - Sometimes I think the sender is mad - Humoristic content is only suitable to known recipients
10. Semantic understanding	
a. Do you have experience with incompleteness of questions or other vague requests? E.g., you considered an e-mail as being just information but it turned out this was actually a request.	Very rarely
11. Phenomenon	

a. What do you think that causes the phenomenon?
   - Abuse of the system of e-mail, it's sometime impossible to determine what's important and what's not. This does not occur at Mansystems.

b. Where do we need to look for a solution? (possible independent variables)
   Helping users to cope properly with e-mail

c. What do you think that are the effects of the phenomenon?
   - No big problems
   - At KPN the problem was under the people, but you could find the same problem with personal or telephonic contact

12. To-do's that are answered

    a. When you have answered a to-do, have you finished the task?
       In this case I meant that I have requested help for that to-do.

EXTRA NOTES:

- Sometimes I have the problem that e-mail is removed by the spam-filter
- I receive 15-30 messages each day
- I used to archive in folders, this became problematic since I lost messages in the myriad of folders, therefore I keep all the messages in the inbox and I'll recover them using the search function.
- Important messages I mark as unread
- At KPN, of course a much larger company, I was less likely to respond on requests of unknown people then here.
- I'm less likely the share information with less known colleagues since I don't know whom I am allowed to share which information with.
- I get a lot of e-mails with misspells inside, this agitates me; I'm less likely responding on this kind of e-mail.

9.4.3 INTERVIEW 3

1. About usage of e-mail

   a. How many e-mail messages do you receive each day? √
   b. How many of them need to be replied by you? √
   c. How many of these messages contain tasks/to-dos? √
   d. How much time do you take to reply on e-mails of which you know the answer immediately? √

2. About feeling of responsibility

   a. Do you feel responsible for the continuousness of you colleague whenever it is in your possibilities to involve? Yes

3. About someone's feeling of responsibility towards e-mail communication and its relations towards e-mail effectiveness

a. Does someone feel responsibility for responding on an e-mail (or the execution of an enclosed task) in general? (Explanatory/ quantitative)	The sender should be responsible
b. Response time	
i. How much time do you take to respond on an easy-to-answer question? (Easy to answer is: short answer without having to find out something)	√
ii. How much time do you approximately take to respond on a question? (Find out awareness using comparison mailbox and answer)	√
iii. Do you think your respond times are above or below average responding times? (Qualitative)	Average, depending on whether I'm busy or not
iv. Do you think your respond times are too slow? (Qualitative)	I think my responding time is good
v. Do you think your respond times could be improved? (Qualitative)	-
vi. How could response time be improved? (Qualitative)	-
c. Response Quality	
i. How do you think the quality of the answers you send relate to the answers that are sent to you?	Answers I receive from my colleagues are pretty complete, answers from customers are a bigger problem.
ii. How much time do you spend writing a response an easy-to-answer question? (Easy to answer is: short answer without having to find out something)	√
iii. Measurement: size question vs. reply?	
iv. When you send a mail with question(s) how do you consider the average completeness of the answer? (10-100%)	
v. How do you think your satisfaction about the way your mail is replied could be increased? (Qualitative)	I don't know
4. About usage of mailbox (Whittaker & Sidner, 1996)	
a. Do you use your mailbox for task management? (Likert scale)	No
b. Do you use your mailbox for personal archiving? (Likert scale)	Yes, I keep important messages in the inbox. Therefore I use the inbox as an archive. Very important mail I copy to the

	general shared inbox
c. Do you use your mailbox for a-synchronous communication? (Likert scale)	-
d. How many folders do you have to file your e-mail? (Quantitative explorative)	I have a folder for every project
e. When do you check your inbox	Sometimes at randomized times, I turned the incoming message sound off.
5. The management of tasks	
a. How do you keep track on your outgoing tasks? (Explanatory/Qualitative)	I just remember it For "incidents" I can see it in the progress
b. How could a personal information management tool be improved in order to give a better overview of in- and outgoing tasks? (Qualitative)	I think it can't.
6. The asynchronous character of e-mail communication gives users the freedom to respond on an e-mail whenever they like to, do you think there a way to have this way of communication more synchronous? (Explorative/ qualitative) Do you use e-mail peri-synchronous sometimes?	- I don't use e-mail peri-synchronous a lot, I rather call in these situations - A chat function in Outlook might be a solution, even better than e-mail are telephone. I now use msn to communicate with colleagues, especially when working on other locations within application management.
7. Attempts to improvements of e-mail	
a. Belotti, Ducheneaut, Howard, & Smith 2003	
i. Although this solution does not solve the lack of delegation of responsibility, do you think this has still this same amount of influence on the lack responsiveness on sent questions after implementation of the software?	- This could be practical; it can even be very practical if everything works automatically.
b. Scerri, Davis, Handschuh, & Hauswirth 2009	
i. Although this solution does not solve the lack of delegation of responsibility, do you think this has still this same amount of influence on the lack responsiveness on sent questions after implementation of the software?	- I don't think this would work. Workflows should be free.
8. Representativeness quantitative research	
a. Do you think your results are representing you e-mail behavior?	Yes I think the results are representing my

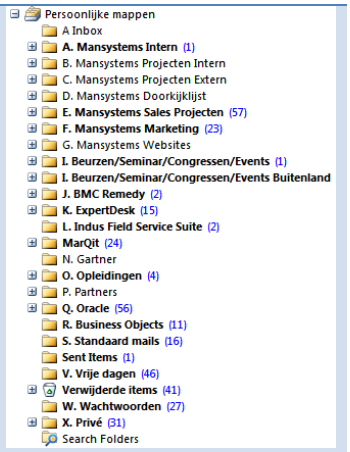
	e-mail behavior. I can't tell whether the two-week time span is enough because e-mail activity is fluctuating depending on projects.
b. Do you think the results are representing the average e-mail behavior in this company?	I think the results are representing the average e-mail behavior.
c. Do you think the survey is missing some important measureable elements about e-mail communication?	- The research should be conducted more often - The size of the company is important and cannot be tested, in larger companies more e-mail is ignored
9. About E-mail in general	
a. Can you explain three or more advantages of e-mail?	- The easiness of spreading information - The asynchronous way of communicating, I'm better concentrated when reading mail instead of having a telephone conversation
b. Can you explain three or more disadvantages of e-mail?	- Too much information can be confusing
10. Semantic understanding	
a. Do you have experience with incompleteness of questions or other vague requests? E.g., you considered an e-mail as being just information but it turned out this was actually a request.	I do, but not a negative experience. In these cases another e-mail or a telephone conversation will end the problem. In the case of e-mail from customers this is a problem.
11. Phenomenon	
a. What do you think that causes the phenomenon?	- -
b. Where do we need to look for a solution? (possible independent variables)	- Making use of phone to correct disturbed e-mail communications - Having a better overview of whether an e-mail is original or a copy. This would especially be a solution in larger organizations
c. What do you think that are the effects of the phenomenon?	- Disturbed information flows
12. To-do's that are answered	
a. When you have answered a to-do, have you finished the task?	- These answers can be new questions - This could also mean I've called the sender

Extra notes:

- Requests per e-mail of which I'm closer involved I'm more likely to reply sooner
- Requests of customers I reply with the message that it is in progress
- The subject is important, I'm more likely to reply on requests that are related to the project of which I'm involved in at that moment
- Every e-mail that I send outside the organization I also CC towards the group's inbox.
- E-mail is more effective in a small organization than in a large organization; in a large organization e-mail is hard to filter.

9.5 FOLDERING BEHAVIOR

#	Number of folders	Explanation
1	21	For each customer a folder. When a customer has more projects, each individual project has a folder as well. Sometimes there will be more folders for one project for multiple time spans. Sent items will also be copied to the therefore created folder by putting himself in the bcc-field.
2		Folders for each customer and sometimes for each project
3		This person gets impatient when the inbox gets muddled up and long. Therefore he is very active archiving his inbox.
4		Archive folders based on customer or system.
5		This person keeps his inbox clean. There are at most 40 to 50 e-mails in his inbox. He doesn't have contact with customers and is not working on customer projects. He has a to-do folder, this is where he moves e-mails to which require further attention.
6		This person has access to a shared inbox. All messages that belongs to a specific project will be moved to a inbox that can be accessed by multiple users. Other e-mail will be archived within three weeks
7		This person has designed himself a strict procedure for handling incoming e-mail. First he copies the mail to a specific folder, and then he answers it directly when it is required.
8		This person tries to keep her inbox empty; she has folders for projects and customers. She has also an inbox for general e-mail for Mansystems.
9	>20	This person uses a highly structured method of archiving incoming e-mail. Like how it is visible in the screenshot he uses letters for keeping a consequent

		sequence in the folders. The projects are in a specific projects folder, and because of the plus-sign there are probably numerous folders for each different project. Does this method of archiving make someone dealing more effective with incoming requests? Research of Bälter (2000) proofed that having too much folders can negatively affect the effectiveness of e-mail usage. 
10		This person has an administrative function. She prints e-mails that needs further action and archives it together with the documents that are related to that specific action. Other e-mails are archived in a folder. Unimportant messages will be deleted.
11	For each quarter	This person archives e-mail in folders based on time. He creates folders for each specific quarter of the year. To retrieve older messages he uses Google Desktop Search.
12	>5	This person has the next folders: • Internal affairs • Training • Sales • Presales • Remaining These folders are further subdivided in different subjects.