The impact of communication technologies on individual workers' productivity

Information Systems Science

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Kimmo Pekkanen

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HELSINKI SCHOOL OF ECONOMICS (HSE)
Department of Information and Service Economy

The impact of communication technologies on individual workers'

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Case TeliaSonera

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ABSTRACT

Nowadays technology is being widely used in almost every aspect of our lives and thus it is essential to understand the role of communication technologies and the ways in which it modifies how we communicate with each other. The research is mainly conducted in the form of case study.

The aims of this research are to identify the capabilities that the communication technologies offer in a target company and how these capabilities are used in practice. Additionally we need to understand how social and situational factors modify the way people use a specific technology. The goal is to understand how the use of communication technologies can affect individual workers' productivity. Productivity is mainly measured on how communication technologies can enhance individuals in performing communicational activities.

The conclusion of the research indicates that communication technologies do not themselves provide productivity gains. Even though individuals have the knowledge and possibility to use the technologies, they also need to use them in a coherent companywide manner. By introducing a communication technology no gains are achieved. In the worst case, an environment with dispersed communication possibilities can hamper the productivity of a worker.

Furthermore, the research concludes that new communication tools cannot change communication practices inside a company without up-to-date communication culture and guidelines. A company's communication culture often has a significant impact in guiding how employees communicate. However, the existence of such culture can vary a lot between different companies and teams within companies.

Table of Contents

List of Abbreviations

AST = Adaptive Structuration Theory
BUS = Business Unit Service
CET= Channel Expansion Theory
CMC = Computer Mediated Communication
DSS = Decision Support System
FAM = Fit-Appropriation Model
GDP = Gross Domestic Product
ICT = Information Communication Technology
IM = Instant Messaging
IS = Information System
IT = Information Technology
MRT = Media Richness Theory
MST = Media Synchronicity Theory
OC = Office Communicator
OECD = Organisation for Economic Cooperation and Development
PRAST = Process Restricted Adaptive Structuration
TAM = Technology Acceptance Model
TIP = Time, Interaction and Performance
TTF = Task-Technology Fit
TTPC = Technology to Performance Chain
UNESCO = United Nations Educational, Scientific and Cultural Organization

List of Figures

1. Introduction

In today's world we use technology in almost every aspect of our lives, one of these being communication with each other. After the invention of the mobile phone and the Internet, our possibilities to communicate with other people have increased in many ways. Face-to-face communication has met rivalries such as the telephone, video conferencing and instant messaging. In addition to these extensions, complementary products such as wikis, forums, boards and co-working tools have emerged. All of these bring us up to a situation where, instead of walking to the landline phone or having to meet with the person, we are interacting with face-to-face, we can pick up our mobile phone or open up our laptop for an immediate communication. This makes it imperative to understand the role of communication technologies and the ways in which it modifies how we communicate with each other.

Due to the availability of different ways of communicating, Information and Communication Technologies (ICT) have received increased attention. Therefore it is essential to clarify what the term stands for. ICT is often used as an extension to the term IT, a special stress is given to the communication aspect. According to (UNESCO 2009) *Information and communication technologies,* it refers to all forms of technology that are used to transmit, store, create, display, share or exchange information by electronic means. Later on when we discuss information and communication technologies we will refer to it simply as communication technologies.

Particularly, during the past decade, Information Systems (IS) field has increasingly applied theories from other disciplines to bring new insights. Therefore, communication technologies and the human activities associated with them have been studied from various perspectives and they have been examined through the lenses of different disciplines. Disciplines, such as management, psychology, sociology and Information Systems, have conducted research in this field.

The interdependencies of different disciplines make it vital to understand how these perspectives can be unified. First of all, *psychology* field can address how technology affects an individual and how the individual's traits affect the use of technology. Psychology can also study how individual factors affect small group dynamics. Along with this field, small group research has widely contributed on the examining how groups communicate internally and externally. From a wider perspective, when humans use technology to interact with other people, social factors come into play. When people interact with each other, it is also contributes to the larger society as well as the smaller group level social factors. *Management*, on the other hand, is interested on how these dynamics affect an organization and how can it be intervened with. *Technology*, especially communication technologies, enables individuals to communicate with each other. Therefore *Information Systems*, being multidisciplinary in its nature, is interested with all of the three above and how these social, individual and technological factors build up the communications inside and between organizations. Hence, the approach of this thesis will have multidisciplinary dimensions and will apply theories from different fields.

There is a lot of evidence that the new societal structures enhance communication and increasingly impose consequences on several levels. ICT sector as a whole is claimed to affect the welfare of any national economy by having an impact on the GDP. The production of communication infrastructure enables the society to apply the provided technologies in new ways. It is also claimed that communication technologies influence how information is distributed inside an organization and how this is stored and shared among members of the organization. There is also undisputable evidence that communication technologies affect the individual's work and have a variety of effects on their personal lives. The environment where individuals work in has changed in the recent decades and they have to cope with trying to encompass larger amounts of information at a faster phase than in the past.

1.1 Background for the Research

The role of ICT sector on economic growth has been studied in the past and it has been proven to have a significant positive effect on it. Since the economic slowdown in the early 1990's, there has been a debate on how much ICT sector affected the following economic growth. Several studies have been conducted where sectors with wide use of communication technologies have been compared to ones that use them less. These studies have resulted in the fact that communication technologies have boosted the economic growth. (OECD 2003)(van Ark, Inklaar & McGuckin 2002) According to some researches, IT's impact on productivity has actually been larger than the amount if capital invested in it (Brynjolfsson, Hitt 2000).

In the Finnish society, the ICT sector has traditionally had a large impact on the Gross Domestic Product (GDP). According to Pohjola, the sector makes up 10 % of total GDP in Finland. In 2006, the ITC sector made up 0,8 of 2 % productivity gains. In the OECD report, no other country exceeds this amount (OECD 2003). Pohjola continues by claiming that technology is the single most important factor that affects the increase of productivity, and general purpose technologies, such as communication technologies, have a significant impact on economic growth. The other two factors that impact productivity gains are investments on both physical and intellectual capital. Technology increases productivity in three ways: by increasing the total productive in manufacturing, by increasing the productivity of work through use of new technologies and by implementing new working methods that the new technologies enable. (Pohjola 2008)

In the economic perspective, this increase of productivity through new working methods has been problematic and its positive effect has been questioned. Researchers have not been able to show that the gains have actually been realized (Pohjola 2008). According to "The Global Information Technology Report 2009-2010", Finland is ranked sixth in the Networked Readiness Index. The goal of the index is to assess the impact that ICT sector has on the given economy. It is measured through three main criteria: the overall environment provided for innovation and ICT use, the readiness to use ICT by the main social actors and how willing the individual actors are to use ICT. In the first

two factors of the index, Finland ranked in the top 5, but on the individual usage the rank was 13. (Soumitra, Irene 2010)

To understand the holistic effect of communication technologies we must analyse how it affects the productivity of individual firms. To compete in today's increasingly competitive environment, companies have to focus on continuously improving their productivity. According to (Watson-Manheim, Bélanger 2007), organizations increasingly rely on information and communication technologies to support flexibility in processes and organizing mechanisms, and to facilitate innovation and responsiveness. One of the biggest reasons of the reliance to communication technologies is that they enable the possibility of communicating over time and space (Belanger, Collins 1998). Members of the organization simply cannot work today without continuous communication. But the issue of dispersed time and space is not only a positive one, companies also face the problems occurring from the fact that people no longer work in the same shared context of traditional office (Bélanger, Allport 2008). It is easy to understand what possibilities video- and teleconferencing with people around the globe offer, but one should also consider the problems about issues such as time zone differences and possible individual isolation (Fritz, Narasimhan & Hyeun-Suk Rhee 1998).

Another issue that has increased the need of communication technologies is the growing amount of data and the need of shared decision making. Project oriented work has become a common way of working. Most knowledge workers are, at any single time, part of several different projects. Having to coordinate, store and share information are essential for any project group. Communication technologies play a key role in making this happen, but are these technologies used in an efficient way? Companies that can provide an integrated way of communicating inside these project groups can provide workers with huge time savings if they offer the right type of knowledge, at the right time and in and easily understandable form.

In addition to providing profit for its shareholders, organizations increasingly have to consider society and its business environment. Organizations are not only about

increasing the performance of the company; they are social entities that are composed of numerous individuals. Companies are responsible to their shareholders on their performance aspect, but they also have to consider other stakeholders when conducting business. The employees of a company are one of the most important stakeholders and they are the ones that organization provided ICT for job completion. Therefore, companies have the responsibility of both conducting profitable business and taking care of their employees. Increasing productivity can sometimes be achieved by increasing the workloads of the employees. Moreover, an increasing debate has been on the issues of remote work and mixing of employees' personal time and work. In today's society the welfare of employees is one of the responsibilities that companies have to deal with.

Also, the amount of information that workers transmit during their normal work days has grown and so has research on how people actually deal with the increased amount of information and the communication associated with it. According to Finland National Knowledge Society Program, today's society requires various skills to deal with information. Skills such as, capability to absorb knowledge readily, complicated problems solving, independent searching of information, information creation and innovation are seen as essential in the future. The report also notes that in the increasingly networked society the capabilities to perform work in various contexts and the sharing of information become important. Imposing such requirements on individuals' skill levels certainly seem prone to affect the everyday work they do. (Valtioneuvosto 2006)

One of the most discussed issues has been information overload and how different people cope with this phenomenon. According to Eppler (2004), *information overload* is simply a notion of receiving too much information. The classical view of information overload is that overload occurs when, within a given time period, information processing requirements are greater than the capacities for processing it (Galbraith 1974). Similarly, the marketing discipline compares the volume of information supply with the processing capacity of the individual. Information overload occurs when supply exceeds demand. In addition, inside today's organizations, it is not only about the

amount of information transferred, but also what type of information is being transferred. Increasingly, individuals are associated with knowledge work. Therefore the amount of effort that is used in deciphering and decoding information has grown.

One of the major reasons behind this increasing importance of information overload is IT and communication technologies. Deployment of new communication technologies such as DSS, Intranet, Wikis, email, IM and extensions of telephones such as telephone conferences and video conferences have certainly had a huge impact on the amount of information transferred through various channels. The discussion has been on the amount of positive and negative effects these technologies have. These technologies have provided the opportunity to adjust when and how an individual sends and receives certain information. It has also provided a better way of pushing the right information to the right person on a timely fashion. The downside of this is that people tend to receive information in a more continuous fashion through several channels, and not all information is relevant for the receiver.

An important question is whether these technologies are used in a unified and correct fashion. Used in a dispersed and illogical way, they can cause more harm than good. Used in an inconsistent way, they can only add to the huge amount of interruptions that and individual worker faces during his/her workday. So the question remains, do the advantages overweight the challenges these new ways of communication pose on the user and how do individuals deal with the challenges they face?

How individuals are affected by overload has been studied for several decades. Already, in his study on people living in cities, Stanley Milgram (1970) observed that when individuals encounter a situation with too many inputs they must set priorities and make choices. In other words, they must adapt to the situation they face. In his article, he identifies six ways of dealing with overload: allocation of less time to each input, disregarding low-priority inputs, redrawing of boundaries in some social transactions to shift the burden of overload to the other party of the exchange, reduction of inputs by filtering devices, refusal of communication reception and creation of specialized institutions to absorb inputs that would otherwise swamp the individual. (Milgram 1970)

Several researches have indicated that each additional piece of information an individual receives, improves his/her performance. But this is true only till a certain point. After this point is reached, additional information no longer improves the performance, but actually deteriorates it (Eppler, Mengis 2004). In his provocative article on information overload, (Hemp 2009) suggests that people are not able the handle the stress caused by continuous information flow and that the information overflow could produce a deficit disorder and even that the current society produces people that are addicted to information.

1.2 Research Question and Objectives of the Research

It is very clear that there are benefits in efficiently using communication technologies and productivity gains can be achieved, but it still remains unclear how companies have implemented these technologies to achieve the gains. Despite introducing the larger impacts of communication to the society, we view that the actual problems occur on the organizational and individual levels. It is somewhat unclear how individuals, management, communication technologies and tasks are utilized in the work environment to result in different communication patterns (Belanger, Collins 1998). It is also stated that investigating the use of new and more traditional communication media to support organizational communications is an important research area (Watson-Manheim, Bélanger 2007). Therefore we aim to examine the use of communication technology in the case company and seek to understand the question of how well communication technologies and the social and individuals patterns fit the business context.

This research will aim to answer three main questions. First we will examine the ICT technologies used in the target company. As Dennis mentions, one future research is on how people appropriate and use media capabilities (Dennis, Fuller & Valacich 2008). Therefore, in this thesis, we will seek to identify the capabilities that the used communication technologies offer and how these capabilities are used in practice. A key question is whether these technologies are used in the way they are intended and is the use efficient. Is there a fit between the capabilities of the communication systems and

the tasks, ways and norms they are used for? It will be important to probe how these ways of using different technologies have been developed in the past and can factors affecting the past appropriations be identified. We will also seek to understand how social and situational factors modify the way people use a specific technology.

By answering these questions, we aim to build up a holistic view of the current communication practices. The approach will include three different perspectives; individual, organizational and technology.. The research questions are articulated as follows:

1. What communication technologies are used in the company?
2. How the capabilities of these technologies are used in social and situational settings?
3. What are the effects of the use of communication technologies from the perspective of individual workers' productivity?

1.3 Structure of the study

This thesis begins by outlining the previous research done on this area. In the second chapter theories from different disciplines are unified and linkages between them and the conducted research are presented. The first section of the chapter introduces research done on the IS field and how the interaction of information systems, individuals and the organization interact. Since communication technologies have to be differentiated from pure information technologies, we introduce the media trait theories where the specific scope is in these traits that communication media have. In the last section, specific attention is given on how individuals communication in groups and generally inside and single organization.

The third chapter generalizes the framework that will be used in the empirical research. Even though this research is qualitative and interpretive in its nature, a certain framework is built to understand the perspective taken. This will be done to help the reader to understand how the perspectives of an information system researcher

differentiates from that of a social studies researcher. This is followed by the fourth chapter where the methodology of the research is described. We will help the reader to understand how the study was conducted. The procedures, which were followed when conducting the researches, are described. This chapter is concluded by building up the validity and reliability of the research.

The fifth chapter will introduce our case company and briefly describe its background and its reasons for conducting this research. The sixth chapter examines the research done and presents its key findings. Finally, the last chapter will conclude the study by summarizing the major findings, identifying the limitations associated with them and presenting possibilities for future research.

2. Literature review

The goal of this chapter is to review previous theories and understand how communication and technology have been studied in different disciples. As mentioned, the use of ICT to communicate is very variable in its nature and many theories and approaches across different disciplines can be applied when studying it. We will start by introducing prior research that has been conducted in the IS field and the use of ICT technologies and provide a brief review of these. Later on the scope will be broadened by analyzing research from other relevant disciplines

2.1 The concept of fit

Since the fit between technology and user will be addressed throughout this thesis, we will examine the concept of fit in this section. To apply the concept of fit in research, one must ensure that it is used in a congruent fashion throughout the study. In this chapter, we shall build up the definition of fit. Without constructing a meaning of fit, one can end up in a situation where one invokes another perspective of fit in the theoretical discussion while employing another in the empirical research (Venkatraman 1989). To

define the meaning of fit for this thesis, we draw from the organizational and management sciences where the concept of fit has been widely discussed. We shall describe Venkatraman's conceptual framework in strategic management and adapt one of the paradigms introduced by him.

Even though Venkatraman's framework is drawn from management literature and focuses strongly on statistical methods of defining fit, it can be applied for this thesis. By clarifying our approach on fit, we ensure that the concept of fit is treated consistently throughout this thesis. In his work, Venkatraman describes six perspectives of fit. These are dispersed on two dimensions, the degree of specificity of the theoretical relationships and the choice of anchoring the specification of fit-based relationships. (Venkatraman 1989)

Figure 1. A classificatory framework for mapping the six perspectives of fit in strategy research
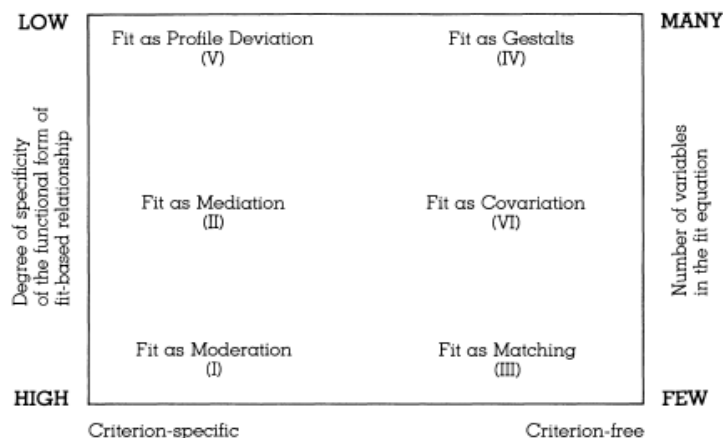
Source: (Venkatraman 1989)

Fit as moderation is constructed from three variable types. There exists a predictor variable that through a moderation variable has an impact on the criterion variable. The fit between the predictor and the moderator is seen as a determinant of the criterion variable. In other words, the change in the criterion variable is measured by changing the moderation variable and analyzing how this change affects the impact that predictor variable has on the criterion variable. The changes measured are the direct effects that the fit has on the criterion variable. (Venkatraman 1989)

The *fit as mediation* is very close to fit as a moderation as a perspective. It also includes a criterion variable, moderator variable and a predictor variable(s). There are two main differences that distinguish this from fit moderation. Firstly, there can be several predictor variables that affect the moderator variable. Secondly, and more importantly, the functional form of fit is measured more as indirect affects and there for is a less precise measure of the fit. (Venkatraman 1989)

The third perspective, *fit as matching*, differs from the types above, by not having a clear criterion variable. The fit is constructed between two related variables. As figure 1 shows, this type of an approach lack a clear anchor point. Therefore the two variables are compared against each other to find a match. These three first perspectives concentrate on creating a bivariate fit, while the three following are more appropriate in analyzing situations with multiple variables. (Venkatraman 1989)

The first of multivariate fits is *fit as gestalts*. In fit as gestalts this constraint is relaxed so that results can be acquired by moving from a holistic view towards the micro level. The key idea in this approach is to find coherence from a set of theoretical attributes. The strength of this perspective is to avoid the inconsistencies that may occur when the problem is decomposed to a bivariate contingency. (Venkatraman 1989)

Fit a as profile deviations creates a specific profile that is tested for fit. This profile is identified to have certain criterion and the profile is anchored to this criterion. This is the main difference compared to fit as gestalts. The fit is how well this profile can be matched to the environment studied. The alignment or misalignment of the environment with the profile then has an impact on the chosen criterion variable.

The final perspective is *fit as covariation*. In this perspective the key is to formulate a set of variables that are linked to form a certain pattern. The difference to fit as gestalts is a more formal approach when constructing the predictor variables and defining the covariation between these variables. The applicability of this fit therefore relies very much on the researcher's ability to reflect the covariation among a set of attributes. (Venkatraman 1989)

In this thesis, we will draw on Venkatraman's definition of fit as gestalts. This will be similar to the approach of Belanger (Belanger, Collins 1998). The reason behind this is that we intended to include multiple attributes to analyze how individuals communicate and on what bases they choose between different communication options. Because of this, we can end up in a situation where we cannot form precise relationships, but we intended to seek internal coherence between theoretical attributes (Venkatraman 1989). By doing this, we intend to identify profiles of fit that can be identified from the research conducted and decipher a more holistic view of the micro level communication happening in the target organization.

2.2 Information System Theories

Throughout the Information Systems research history, there have been extensive studies on how individuals use information technologies, what affects the decision to use a specific technology, how technology and context affect the decision of use, how do social factors impact the use and what are the individual and organizational implications of IS usage. The goal of this work is to apply IS to the organizational use of communication technology. We will start by describing Goodhues Technology to Performance Chain model. TTF has been built on Davies et al.'s Technology Acceptance Model (TAM) and DeLone and McLean's IS success Construct In this chapter, we will briefly discuss these previous two models and describe the Technology-to-performance Chain model. We will continue by describing Adaptive Structuration Theory (AST) and Fit-Appropriation model (FAM). In the following section, we will go through the general Media Trait theories that have been used to explain how people choose among different communication technologies and channels. Later on we will also examine how small group research defines communication process and what role technology plays in this process.

2.2.1 Task-Technology Fit

Figure 2: Technology Acceptance Model
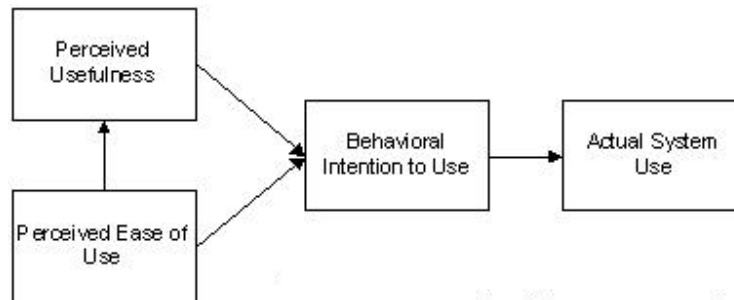
Source: Davis et. al. (1989), Venkatesh et. el. (2003)

In its essence, Task-Technology Fit is based on two different models; Technology Acceptance Model and Information Systems Success Model. In order to information systems to enhance the performance of individuals, they have to be used. Davies et al.'s TAM identify in their Technology Acceptance Model two determinants that cause an individual user to either accept or reject information technology (IT) usage. In their research, they indicate that *perceived usefulness* and *perceived ease of use* are the most influential factors on individuals' information technology usage (Davies 1989).

Perceived usefulness is the degree to which a person believes that using an information technology would enhance his or her job performance. In other words, users evaluate the potential impacts that the usage of a specific information system will have on their performance. The other determinant*, perceived ease of use,* refers to the amount of effort that is needed from the individual's part to use the information system. These two factors concentrate on the user perspective of a successful use and therefore have a narrow scope on the holistic picture of applying information systems to a certain context (1989).

Since the original introduction of the model, it has been enhanced and integrated to other models, such as Goodhue's TTF (1995), Venkatesh et al.TAM2 (2000) and Venkatesh et al. Unified Theory of Acceptance and Use of Technology (2003).

Figure 3: Information Systems Success Model
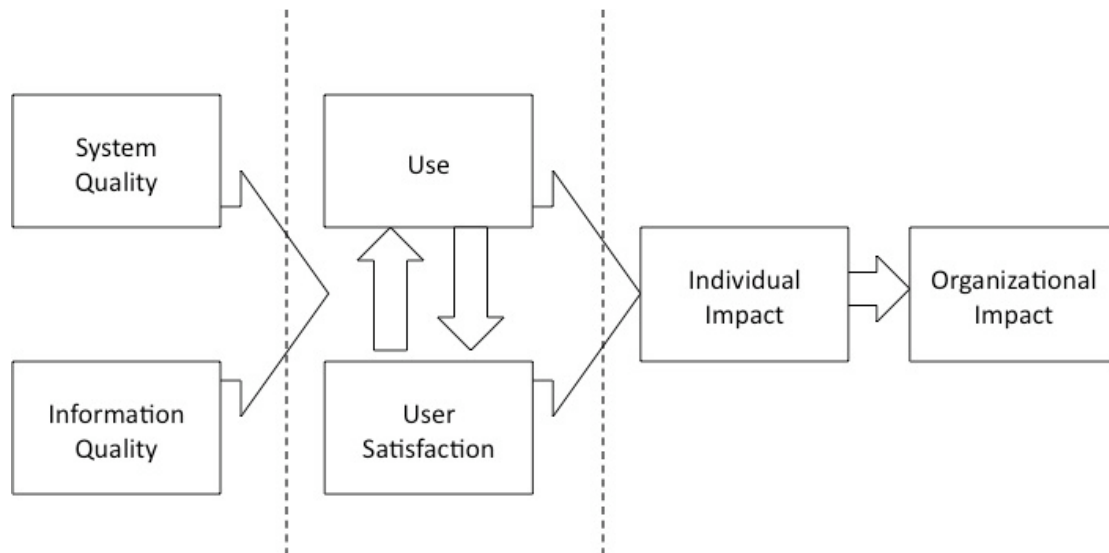
(DeLone, McLean 1992)

DeLone and McLean take a rather different approach to IS. Their model aims to identify those dependent variables that contribute to IS success. Their research concludes that there is not one, but many measures that can affect the success of an IS. In their model, all variables can be categorized under six main categories.

System quality tries to identify those factors in the system architecture that impact on successfully using IS. These are often engineer oriented and concentrate more on the time before the use. *Information quality* is the quality of the output that the IS generates. This is often examined from the perspective of a user. The *use* of IS has traditionally been one of the most frequently used measures of IS success. The variable can be applied in various ways, but is often only simply measuring whether an IS used or not. *User satisfaction* measures how content users are with the IS. This measure is very useful if one is comparing individuals' use of a specific IS, but the downside is that in a large IS it can be hard to identify those systems that cause most of the satisfaction. The fifth category, *individual impact*, is rather difficult to define exactly. The impacts are very

context dependent and measuring them can be hard. Generally, it can be said that for IS to have an impact on the individual it has to change the behaviour of the user (Mason 1978). The last category, *organization impact,* is also somewhat problematic. The main problem is to isolate those performance effects that are due to the IS.

In these two models, it is implicitly assumed that information technology affects utilization of IS and an increased utilization has a positive impact on performance. The missing ingredient here is the fit. In his TTF model, Goodhue argues that utilization does not necessarily lead to high performance. He also states that the fit without utilization does not lead to performance impact. Therefore Goodhue's Technology-to-performance chain (TTPC) combines the task-technology aspect of DeLeon with Davies TAM.(Goodhue, Thompson 1995)

In Goodhue's TTPC model, *technologies* are described as those tools available for individuals to carry out the tasks. In his model, these technologies can be applied to either a specific IS or a more general impact of a set of systems. *Tasks* are seen as the actions carried out by an individual to turn inputs into outputs. In Goodhue's approach technologies are simply those techniques that could be mixed up with tasks. *Individual characteristics* are those traits embedded in an individual that affect his/her ability to utilize technology to accomplish a task. Some examples of these can be a training and motivation. These three factors can be seen as the antecedents of TTF.(Zhang, Galetta 2006)

Task-technology fit is the degree that technology assists an individual in performing his/her tasks. It is the interaction between task, technology and individual characteristics. The TTF is seen as the gap between the task and the technology. Similarly, according to McGrath, group interaction and performance is greatly affected by the nature of and the level of difficulty of the task that a group is performing (McGrath, Hollingshead 1994). Therefore the amount of gap occurring will have an effect on the performance of the individual and a group. *Utilization* occurs when an individual uses the IS in task completion. The *precursors of utilization* come primarily from the studies of other disciplines, such as organizational and behavioural sciences.

15

Despite this, they still have important role on the individuals' IS usage. In Goodhue's model, TTF is also linked to utilization. It is one of the determinants of individual choosing to use an IS. (Goodhue, Thompson 1995)

Figure 4: Technology-to-performance Chain
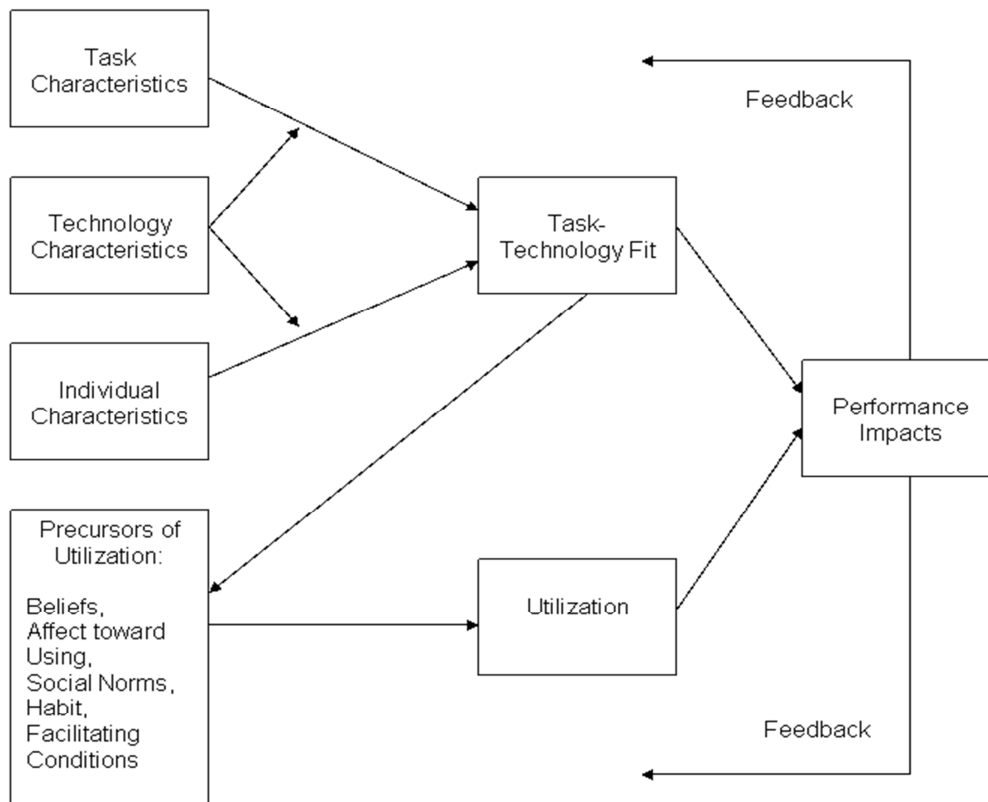
Source: (Goodhue, Thompson 1995)

The third part of the model integrates the ideas of the two models introduced earlier. In Goodhue's model performance impact is the efficiency and effectiveness gains accomplished by using the IS. The variable is affected both by the TTF and the utilization. In other words, with any give utilization level a higher TTF means greater performance impacts. This means that TTF improves performance by directly influencing the performance, but also indirectly through increasing the possibility of utilization (Zhang, Galetta 2006). A similar conclusion is done on (Todd, Benbasat 1999) work on Decision Support System (DSS) implementations. In their research, they argue that the right fit influences on how individuals and groups use a specific IS. The utilization of this system, then in turn, has a performance effect (Todd, Benbasat 1999).

The TTPC theory itself forms a good foundation for this study. We aim to find how users see the possible technology traits and how these form a fit with their daily tasks. We also examine how different individuals perceive the potential benefits of using a certain technology. However, TTPC provides a limited framework to understand the contextual setting where the technologies are used. It also lacks the specific traits that communication technologies possess. Therefore we aim to provide support from other research to adapt this to suit our study.

2.2.2 Adaptive Structuration Theory

The basis of (DeSanctis, Poole 1994) Adaptive Structuration Theory comes from the social sciences. Its roots are in Anthony Gidden's Theory of Structuration. In his theory, IS s not seen as a key concept, and he barely even mentions them, but IS theories have borrowed a few concepts from his work. The key concept is his definition of structure and its duality. Structure is created through everyday social practices and the individuals performing them. In other words, it is manifested by the rules and resources, organized as properties of social systems. Through duality, it is seen in a way where neither the individual nor the society determines the other, but where the two factors constantly have an effect on each other. Individuals have an effect on how the society is constructed, but the social context is built up by an individual and also very much determines how individuals act. Giddens states that: (Giddens 1984) "According to the notion of duality of structure, the structural properties of social systems are both a medium and outcome of the practices they recursively organize". (Giddens 1984)

One example of how the above theory has been applied in the field of IS comes from DeSanctis and Poole who adapt the theory to suit to advanced information systems in organizations (DeSanctis, Poole 1994). They argue that the input factors in TTF fail to recognize that the users can use the intended factors in a different way that was intended. In their, view today's Information Systems are composed of both a human and technology component. Their view parallels that of Orlikowski's where Information Technology is seen as a part of organization structure that interacts with the other component, people, inside the organization. In addition, both people and Information

Technology have the ability to change over time and affect changes occurring in either of them (Orlikowski 1992). Even though Orlikowski defines technology as a material artefact, she still seeks to avoid it being seen simply as physical. Compared to TTF model the AST imposes main focus on the social structures not the technology aspects, therefore, in my opinion they complement each other.

Figure 5. Adaptive Structuration Theory
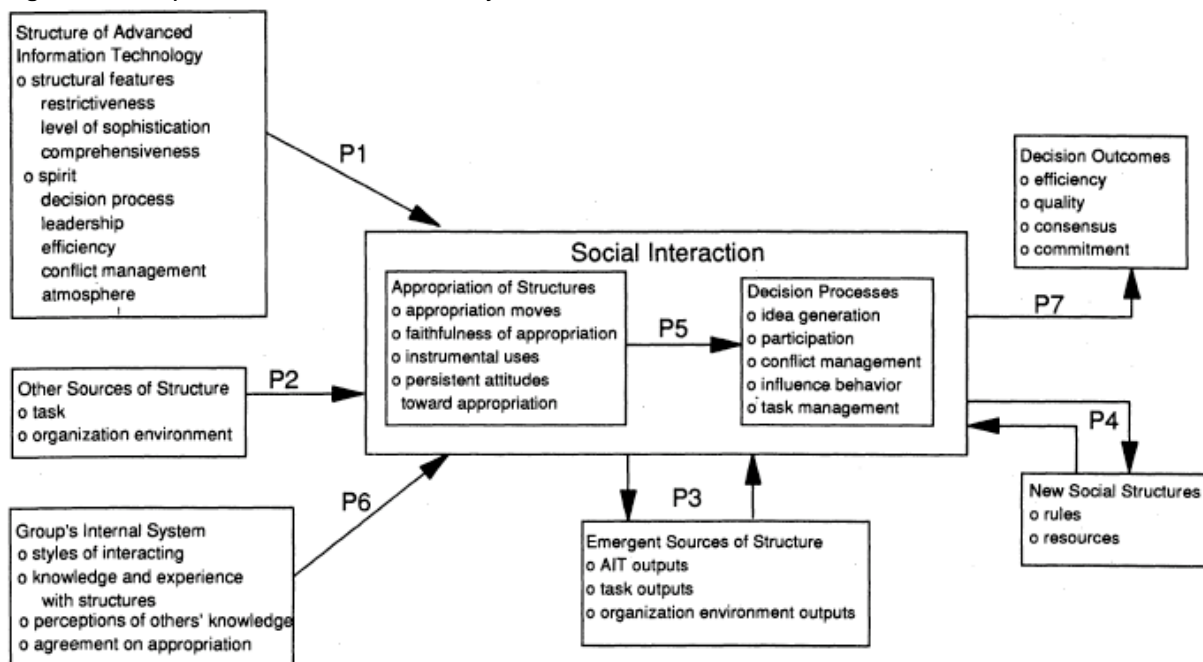
Source: (DeSanctis, Poole 1994)

The above picture presents the main components of AST, and the social presence structure is very evident. The structure is seen as affecting both what and how a specific IS is chosen and implemented before the actual implementation (P1). Like in Gidden's work, the structure is not seen as the IS artefacts but the social meaning of how to use these artefacts. In addition to this, the actual use in action is seen as affecting the structure of IS. This is the social interaction that can have a significant effect of how technology is either used or left unused. Another key aspect of this social interaction is appropriation of the structures. This is how the actual users utilize these systems in action and how the existing structure affects the appropriation. This will then impact either positively or negatively on the desired change in IS processes and their outcome.

In addition to these key components, the social interaction is influenced by a task at hand, a group performing the task and the possible larger social environment where the group is working. Adoption of a new IS can also lead to changes in both the information and social structures, and these can affect the forthcoming implementations of IS. (DeSanctis, Poole 1994). The key idea is that IS structures are not implacable, but they can be produced and reproduced through changes in systems and actions done by individuals (Jones, Karsten 2008).

As mentioned, appropriation of technology plays a key role in how the adapted technology becomes embedded in the organization. (DeSanctis, Poole 1994) presents four ways in how appropriation practices can vary. Firstly, groups may adopt one the following *appropriation moves:*

1. directly use the social and technology structures;
2. relate the structures to other structures;
3. constraint to interpret the structures as they are used; or
4. make judgements about the structures.

Secondly, users may appropriate technology either *faithfully* or *unfaithfully.* The technology that is to be adopted is designed to follow a certain spirit; that is how technology should be used according to the designers. The users of the technology then can decide to either use the technology according to the spirit, or not to use it in accordance. A similar notion is made by Van de Hoff. According to him, the user is heavily influenced by the organization, but he or she still has a certain freedom in the extent to which and way in which to use the medium (Hooff 2005).

Thirdly, the technology can be used to advance some other *instrumental* aspects. For instance, the technology can support other tasks than what it is designed for or it can be used to exercise power or influence. The fourth aspect discussed is the *attitudes* of the users. It includes the following factors; how confident the users are with the technology, how valuable the users perceive the technology to be and how hard the users are willing to work to excel in the use of the technology. The authors conclude by arguing,

that even though these structures are not always evident, they do exist in the essence of group decision making, the "deep structures". (DeSanctis, Poole 1994)

(Wheeler, Valacich 1996) continues on the AST, by identifying processes that can be used to guide the appropriation so that it matches with the initial goals of the IS implementation. In their study on DSS, they build up an instantiation of AST, Process Restricted Adaptive Structuration Theory (PRAST) (Wheeler, Valacich 1996). In their work, they recognize three appropriation mediators: training, facilitation and DSS configuration. In addition to this, these appropriation mediators, through process guidance, process restrictiveness and communication modes, have an effect on the social interaction described in AST and the decision outcomes.

When using a specific IS, users often have options on how to move forward when a subtask has been completed. The user can be guided to the right direction. This *guidance* can be done in three ways. Forwards guidance informs the user on what should be done next. Backward guidance, on the other hand, shows the user that something is unfinished and should be completed to continue forward. Preventive guidance prevents disruptive breakpoints. The overall purpose of guidance is to lead a group through procedural obstacles in faithfully using a heuristic's structures.(Wheeler, Valacich 1996)

Restrictiveness is seen as a component of IS that restricts the options of the user. According to (Silver 1990), *restrictiveness* is defined as follows: "the degree to which and the manner in which a decision support system limits its user's decision-making processes to a subset of all possible processes" (Silver 1990). Silver also continues that restrictiveness is not only a function of the system, but the interplay between the user and the system. Wheeler describes restrictiveness as preventing both unfaithful use and choosing an alternative structure (Wheeler, Valacich 1996).

Figure 6. Process Restricted Adaptive Structuration Theory (PRAST)
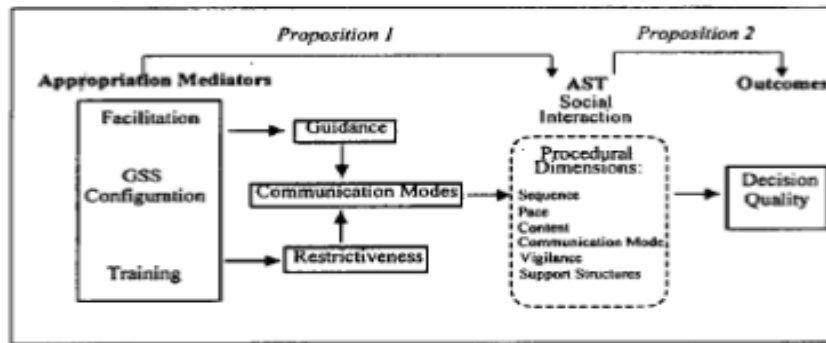
Source: (Wheeler, Valacich 1996)

Communication modes are all those communication possibilities that are available for the group in their decision making process. According to (Wheeler, Valacich 1996), this communication can be verbal, gestural on computer mediated. He continues to argue that in group DSS is problematic since it can not be controlled through systems. The people trying to decide on something always have the option of moving to a completely verbal way of deciding on something and by doing so applying and creating their own structures.

In my view, the most interesting part of PRAST theory is the *appropriation mediators*. They are seen as those factors that steer the users towards the faithful appropriation. These mediators are seen as being either active or passive. Facilitation is seen as an active mediator. When using a specific IS, facilitating provides a possibility for immediate feedback from the facilitator through the same communication mode used in the appropriation. GSS configuration and training are a more passive way of affecting the appropriation. Configuration provides the system with a general intent on how it should be used. This can, up to some degree, guide the user. Training on the other hand, can provide the user with knowledge and experience on using the provided structure. When applied correctly, training can provide users with a heuristic understanding on the structures and realistic expectations on what appropriation possibilities the IS provides.(Wheeler, Valacich 1996)

AST gives us an important insight on relation between technology, organization and the individual using it. Even though a specific communication technology would be designed for a specific use, this does not mean that this is how it is actually used. Therefore we must understand that all situational, organizational and individual factors can alter how communication technologies are actually used. From AST we specifically take the organizational factors that can have a significant impact on technology use. It complements the TTPC by including factors outside the model. Unlike TTPC, AST concludes that TTF not only affects the environment, but also impacts on all the inputs provided to form a TTF.

2.2.3 Fit-Appropriation Model

(Dennis, Wixom & Vandenberg 2001) takes a similar approach to TTF in finding the right fit between IS systems and applying it in an organizational contexts. The FAM seeks to combine the TTF approach with an approach that focuses on the appropriation on technology. The perspective that he approaches the issue is somewhat different. In his work, appropriation of technology replaces the utilization mentioned in TTF. Dennis argues that how people use a technology is at least as important as its fit with the task. In his work, the key role is on the users and how they appropriate technology. In addition, Dennis sees the communicative technologies more as structures, in a way defined in AST, that support the performance of the groups studied.

In his article, (Dennis, Wixom & Vandenberg 2001) argues that TTF is not sufficient enough to improve the performance. The appropriation of the technology should be supported, for example, by mediators such as those described by Wheeler (Wheeler, Valacich 1996). In FAM task-technology, fit's effect on performance is moderated through appropriation. In his study, (Dennis, Wixom & Vandenberg 2001) concludes that a good TTF between the communication capabilities and the task improves the effectiveness outcomes and appropriation support also impacts efficiency and user satisfaction.

In a more recent work with Fuller, Dennis argues that, in fact, fit has an effect only on the initial implementation of an IS (Fuller, Dennis 2009). The TTF may affect the performance through influencing how much appropriation is needed. But through appropriation, users can adapt the system in a way that enables them to use the system even though the initial fit would be poor. The key is that poor fit teams have to make more revolutionary changes in the systems to use them in the way intended. It is also questionable whether the groups can incrementally apply the misfit systems exactly in the way intended.

Even though we do not use the FAM itself, we adapt the same approach as a general approach. We note that TTPC itself is not sufficient enough to examine the potential performance gains of using certain technologies. From AST we take the mediator for creating the actual performance result. We examine the research done in the media trait theories as a mediator to understand how performance gains can be achieved through communication technologies.

2.2.4 Media Repertoires

Even though there has been a wide range of research on how organization implement different Information Systems and what are the factors affecting the individuals usage of IS, there have been relatively few studies on how individuals actually use a combination of different communication technologies in their work environment. One of the few researches studying this mix of communication tools is (Watson-Manheim, Bélanger 2007) media repertoires. The goal of their study is to understand the patterns that occur when individuals interact using various ways of communicating through electronic mediums. They introduce a concept of *media repertoires* and define it as the collection of communication media and identifiable routines of use for specific communication purposes within a defined user community (Watson-Manheim, Bélanger 2007). In their research, (Watson-Manheim, Bélanger 2007) studied the use of different communication technologies in two case companies and identified common factors in using different medias for communication. They divided their findings in two contextual factors, institutional and situational.

(Watson-Manheim, Bélanger 2007) introduces *Institutional* factors as those that build up the environment where individuals work and communicate both directly and indirectly. These are all the physical and social structures that the organization imposes on its employees. The physical structures have a strong effect on how much ICT is used in the organization. The layout, the amount of remote work done and the range of communication technologies are examples of physical structure that affect how communication occurs in an organization. Social structures are all those explicit and implicit structure that are built up inside the organization. This accounts for everything from the general organization wide social norms to the relationship between two single individuals. (Watson-Manheim, Bélanger 2007)

Another factor having to do with how individuals communicate in an organization is those *situational* factors that describe how specific communication undertakings vary between each other. (Watson-Manheim, Bélanger 2007) describes three situational factors that contribute to how an individual performs in a given communication happening. *Task characteristics* are described as those issues that are affected by the amount of interactivity needed and the amount of written documents that are preferred in the communication process. *Message characteristics* are seen to be dependent on how easily the information communicated can be understood. According to (Watson-Manheim, Bélanger 2007) sensitivity of the information affects what channel is chosen. The last situational factor is *urgency.* (Watson-Manheim, Bélanger 2007) describes urgency as how quickly the communicator requires a response to his/her message. Urgency is also described as a reason why individuals switch to another channel if they do not receive an answer.

As being one of the few IS researches conducted specifically to communication technologies we use Media Repertoires to understand the situational setting of communication. Media Repertoires provide us a bridge between IS studies and Media Trait Theories and in our study this is actually used on describing the communication fit, not the actual traits of the communication technologies.

2.3 Media Trait Theories

The aim of this research is, up to some degree, to integrate IS research with those done on media theories and small group interaction. One cannot assume that studying IS and computer mediated communication (CMC) are completely the same, they are not. As stated, relatively little study in the IS field has focused on how people choose what communication media they use from a wide range of possible choices. Therefore we introduce a set of media trait theories that have studied how specific media suit a certain type of communication. Theories such as Media Richness Theory (MRT), Channel Expansion Theory (CET) and Media Synchronicity Theory (MST) have been used to explain the relation between the media used to communicate and the type of communication occurring . From these, especially MST will be used in the development of this thesis framework, which will then be used to conduct the research.

2.3.1 Media Richness Theory

In the 1980's, Richard L. Daft and Robert H. Lengel created the Media Richness Theory (sometimes also called Information Richness Theory). Their argument was that the communication task and the communication media could be matched to improve communication performance. In their work, they claim that there are two main factors that affect communication process, *uncertainty* and *equivocality*. *Uncertainty* is the difference between the amount of information required to perform the task and the amount of information already possessed (Galbraith 1974). According to Daft, to minimize uncertainty, organizations must acquire sufficient information and distribute it to the right people. *Equivocality* means that there always exists ambiguity about the same information inside the organization. Therefore, for efficient communication to occur people need to understand the same information in a similar fashion. The difference between these two is that to reduce uncertainty information must be acquired, but to reduce equivocality people have to share and pool their knowledge to overcome disagreement and reach an common understanding. (Daft, Lengel & Trevino 1987)

According to these two factors, Daft et al. categorized communication media across a continuum of media richness. The other end has a very lean media while the other rich media, these two were named as either lean or rich media. The richness was defined according to (1) speed of feedback, (2) ability to communicate multiple cues, (3) ability to present individually tailored messages, and (4) the capability of the channel to use natural language when conveying a message. The theory also implies that the richer a media is, the more social presence can be conveyed through it. In his article, Daft claims that equivocal tasks should use richer media while objective and well understood problems with low equivocality should use lean media. In his research, he concludes that the mismatch with the media is one reason behind communication and decision making failures and to reduce these, the message and media should be matched. (Daft, Lengel & Trevino 1987)

2.3.2 Channel Expansion Theory

Even though MRT introduced by Daft et al. gained some support, there were also many inconsistencies within research results when MRT was applied. Especially the new communication media failed to fully support the theory. The original MRT failed to address the fact that the new communication media can vary in their richness. One extension for MRT that broadens the scope is Carlson et al.'s Channel Expansion Theory (CET). In CET, Carlson et al. see media characteristics more dependent on user experience and perception and less embedded into to chosen media. By doing this, they aim to address the problem of seeing media objectively. They also claim that users get more accustomed and change their habit of media use when they get more familiar with a specific media.

Figure 7: Channel Expansion Theory
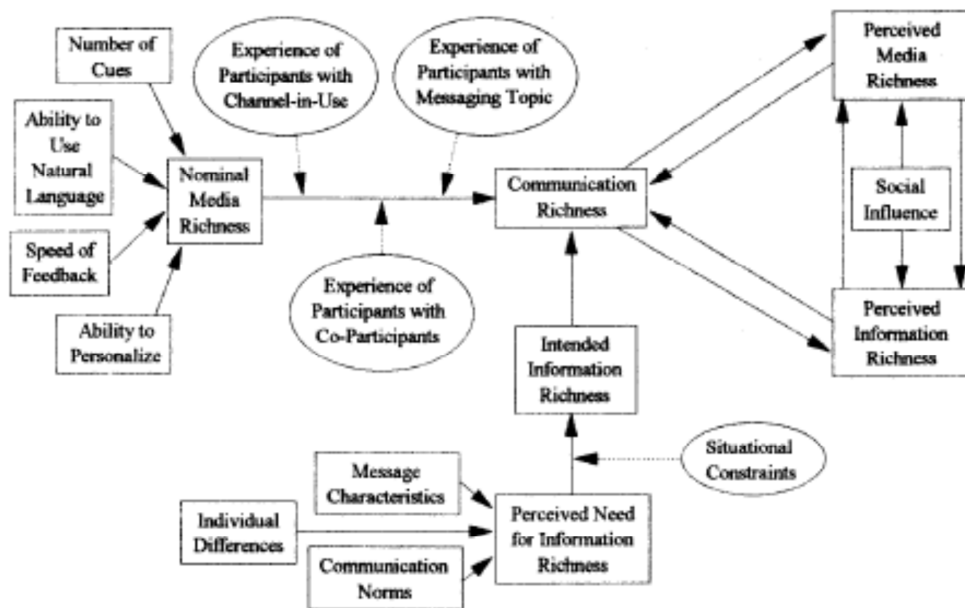
To broaden the scope of MRT, Carlson et al. include three additional items that affect the communication process. In their work, *nominal media richness* is very much the same as MRT and defines the inherent capabilities of any given media. To complete media, they propose *perceived media richness*. In figure 5, this is the right hand side of the picture. In *perceived media richness* the richness is not only the inherent capabilities, but also how both the sender and the receiver of the message, perceive the richness of any chosen media. The authors also distinguish information and media richness. The difference is that media richness describes a specific media's capacity to carry equivocal information, whereas information richness is the information's capability to reduce equivocality. It is therefore not dependant on the channel, but the interaction of the communication participant and the context. (Carlson, Zmud 1994)

The second, and probably the most important addition on CET, is the participant experience that is located between nominal richness and communication richness. According to Carlson et al., people gain new knowledge and experience throughout the communication history of a specific media. In his study of interaction between organization and technology, (Hooff 2005) offers similar findings. What he describes as

learning is: "over time, users—reacting to the demands from organization, environment and their tasks, and the opportunities that electronic mail offers them—will learn to use email to a greater extent, will use it for a broader range of tasks, and they will use it with more effect" (Hooff 2005). This learning or experience is gained on what, how and who the users communicate with. This changes how individual users perceive the media richness and reduce the difference with the nominal and communication richness. Through the use of different media, they learn to use the given media channel more efficiently (Carlson, Zmud 1994).

For example, the communicators learn to decode and encode messages so that both ends understand it. This is evident when two people working on the same area use their own work jargon. Efficient encoding and decoding can substantially increase the performance of communication, but adversely it can also cause negative mental effort it if one of the sides has to use additional effort to understand the message. (Carlson, Zmud 1994)

The last of the three areas affecting communication richness is intended *information richness*. The authors argue that according to the task at hand and the information being sent the user decide on the intended need for information. They see that the communication information has a "richness requirement" that is defined as the amount of richness needed for the information to be successfully transmitted. The amount of richness individual sees appropriate is also affected by the message, its equivocality, the situational factors and the organizational communication culture. (Carlson, Zmud 1994)

The above mentioned factors all affect how the communication is actually realized and what amount of communication bandwidth is actually used. Like Daft et al. proposed, the richer media will require more bandwidth than lean media (Daft, Lengel & Trevino 1987). But unlike in MRT, Carlson et al. claims that in addition to inherent media characteristics, there are individual, contextual and organizational factors that strongly affect how lean or rich media is chosen for the communication process.

Both the MRT and CET provide a solid ground on how interpersonal communication occurs, with and without technology use. We argue that to understand the later research, acknowledging the contributions of these two studies is important. For example much of the ideas in Dennis MST are followed by these researchers.

2.3.3 Media Synchronicity Theory

Dennis et al. Media Synchronicity Theory (MST) continues on developing from the premises of MRT. They start by redefining the task and the media traits defined in MST. They also move to a more subjective view of media capabilities and understand them according to how they are used and the context they are used in. Through these changes, they form a more comprehensive view of communication performance, not only media choice. Due to the comprehensive nature of the model, we will only partially describe the model in this paper. We will focus on the media capabilities, communication process, appropriation factors and media synchronicity parts shown in figure 7. These factors are the ones match the scope of this these and complements the other theories introduced.

In MST, Dennis et al. take a new view on tasks. They argue that in previous work on tasks and the scope applied has been too broad. Their approach takes a more micro level view, and according to it, all communication can be broken down to either being *conveyance*, *convergence* or some combination of these two. *Conveyance* is the transmission on information throughout the organization. After the message is conveyed, it is up to the receiver to create and revise a mental model of the provided information. *Convergence* is the discussion of pre-processed information to form an interpretation of it and to mutually understand its meaning. All communication tasks are then a combination of these two (Dennis, Fuller & Valacich 2008). Therefore people involved in communication process must both share information and interpret it in order to communicate efficiently (Miranda, Saunders 2003). These definitions are then matched with their analysis of media capabilities.

A very similar approach is conducted by Kerr. In his study on GSS, he argues that information transferring can be either *divergent* or *convergent. Divergent* communication should provide an opportunity for amounts of information to be conveyed and the amount of bandwidth used correlates to positive effects. In contrary, in *convergent* communication, analyzing information and identifying the right solutions is a relevant issue. (Kerr, Murthy 2004)

The key concept of media synchronicity is derived from the word synchronicity which means a state in which actions move at the same rate and exactly together. Dennis et al. define *media synchronicity* as the extent to which the capabilities of a communication medium enable individuals to achieve synchronicity. They also specify that synchronous communication is a requirement for synchronicity, but synchronous communication does not entail that synchronicity exists. These two combined with conveyance and convergence then result in the conclusion that convergence requires a higher degree of media synchronicity than conveyance in a specific communication process. (Dennis, Fuller & Valacich 2008)

In the model, Dennis et al, define *media capabilities* as the potential structures provided by a medium which people use for communication. The approach is based on Warren Weaver's work that describes how communication systems work. The chain starts by the information source that encodes the message that is being sent. This message is then transmitted to the receiver through a transmitter. After the receiver receives a message, he/she decodes it to his meaning of the information. (Warren 1949)

Figure 8: Communication system
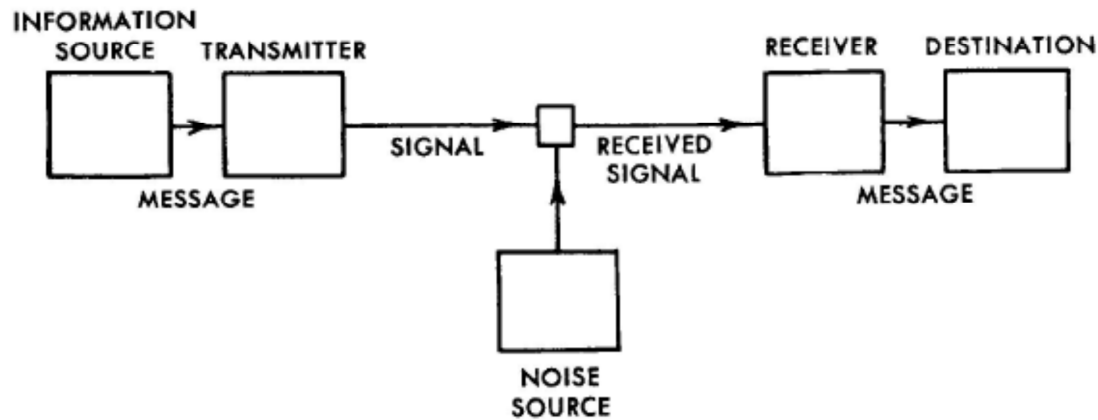
Source: (Warren 1949)

In MST, Weaver's model is adjusted to suit the new media communication tools. Dennis et al. identify five media capabilities that affect how information is communicated from the sender to receiver and how new medial tools support this communication. The five are *rehearsability, reprocessability, symbol sets, transmission velocity* and *parallelism*. *Rehearsability* is how media assist the senders to encode information according to the receiver. This means that the message can be altered so that information attached to it is not lost. *Reprocessability* explains how media assists the receiver to decode the original message from the message. It also provides the receiver more time to interpret the message and, if needed, to come back and re-examine the message later. These two can provide both the sender and receiver additional time to examine the message and address additional information to encode or decode the massage. The downside is that this creates delays for the communication process. Therefore the authors argue that these two media capabilities are more important to the conveyance of information. They also have a greater effect on the individual's information processing capabilities than on the actual transmission on information. (Dennis, Fuller & Valacich 2008)

Transmission Velocity is the speed at which a medium can deliver a message to intended recipients. In other words, this means that increased velocity allow faster feedback and lowers the response time. *Parallelism* describes how many simultaneous transmissions a certain media can support at the same time. Today, new media tools

31

increasingly support concurrent transmissions and increase the volume of information that can be transmitted at any given time. This also means that communicators can use several channels at the same or send the same messages through different channels. This is called "multicommunication". Reinsch defines multicommunication as engaging in two or more overlapping, synchronous conversations (REINSCH, TURNER & TINSLEY 2008). Therefore it allows the users to complement information transmission by another channel, but it also allows shifting focus from one communication channel to another. As a result it may reduce synchronicity since people tend to pay attention to many channels instead on using just one.

Symbol sets are ways of how information can be encoded to a certain media. Like with parallelism, the new media allows increasingly variable ways to use symbols to increase communication efficiency. Such symbols, like graphs and tables, allow the receiver to quickly grasp the essence of a transmitted message. Therefore Dennis et al. argue that by matching symbol sets with the information communicated, one can increase both efficiency and synchronicity of communication. These three are closer to objective media traits. They provide the individual communicators the potential ways that media can be used to communicate information. (Dennis, Fuller & Valacich 2008)

The last determinant of Dennis et al. "fit" is appropriation factors. The author's acknowledge that the users in the end decide what communication media they use, but the capabilities provided by the system strongly steer the users towards certain user behaviour. When appropriating a specific media the previous experience and provided learning possibilities also have a strong influence. In addition to users' personal preferences, also social norms inside the organization influence what is being used. (Dennis, Fuller & Valacich 2008)

Figure 7: Media Synchronicity

Figure 1. Media Synchronicity Theory
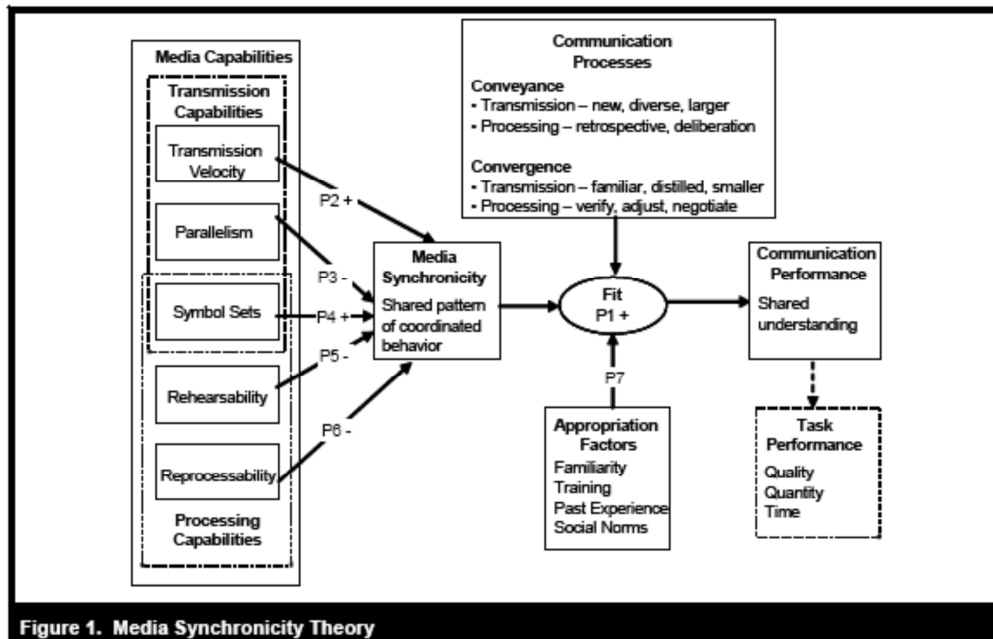
Source: (Dennis, Fuller & Valacich 2008)

The media capabilities introduced in MST are used to analyse the capabilities that certain communication technologies provide for a communication occurrence. We use this research in a very similar way that Dennis does. In our research we aim to find how well these capabilities are realized in our target company and how well these comply in our research environment.

2.4 Communication in Organizations

To understand communication in an organization we have to accept a very broad view on group communication. Communication can be anything from a single phone call to a long term communication strategy conducted by the corporate lead. In this these we don't want to exclude any forms of technology enable communication outside the examination. According to McGrath (1984), the essence of small group interaction is a recognized relation between two or more members that have some past and/or future

relation. This means that communication, or interaction as McGraths refers to, is a very essential part of organizational working environment. Because in every communication at least two members are involved, it can be stated that to some degree all communication is part of group interaction. Therefore, to study communication happening inside organization, we must not only understand the macro view of all communication happening inside and organization, but also see the small things making up each individual communication.

McGrath describes today's organizations as being partially nested and loosely coupled. *Partial nesting* means that inherently an individual is not part of a single group, but rather a member of several groups, that then overlap and interact with others groups within the organization. Being *loosely coupled*, according to McGrath, means that individuals are related to the organization on two levels. At the same time individuals are related to others individuals in the same temporal group and to the whole organization and its social norms. Another important insight from McGrath is that we can directly observe only part of the communications happening inside of the group. Actually much of the group communications happens in very informal circumstances and only between some of the group members, not when the actual "main" group is present. (McGrath 1991)

2.4.1 Communication Process

In his article, Groups: Interaction and Performance (1984), McGrath describes a micro view of communication taking place in small groups. He introduces four key variables that affect small group interaction process. All group communication is made up from these variables. *Properties of group members* are those inherent attributes of each group member that they bring along when they interact with other people within in a group. These personal traits can then affect the interaction in various positive or negative ways. The second variable is how group member are related to each other. These *group structures* define the past experience that these interacting members have with each other and how these experiences effect on the future interaction. For interaction to occur there has to be some motive. According to McGrath, *task* defines

why members interact with each other. The characteristics of the task being performed have a strong influence on what sort of interaction occurs. The last variable is the *environment* that the interaction takes place in. There is a difference if the interaction happens in a specific conference room or an unofficial dressing room. This is very much something the new communication media has changed. The time and place setting with the new mobile tools are quite different than the traditional face-to-face communication. (McGrath 1984)

McGarth also describes a micro view of the interaction process when two or more people interact. He identifies three modes of communication. Communication pattern is the middle part in Figure 8. *Communication process* is the part where A takes action to communicate with B. This is then mediated through the chosen channel and forms a communication pattern that is received by B. (McGrath 1984)

In addition to the channel affecting the received message, also the types of task and interpersonal components have an effect. *Task process* describes how the task and its content affect the outcome of the interaction. The interaction of task content between the communication participants forms the task performance pattern. *Interpersonal relationship process* reflects the previously stated properties of group members and structures that affect both participants. This lower part of the pictures forms the interpersonal relationship pattern. The three patterns not only affect the communicators, but also each other.(McGrath 1984)

Figure 8: Interaction as a Three-Stage Process
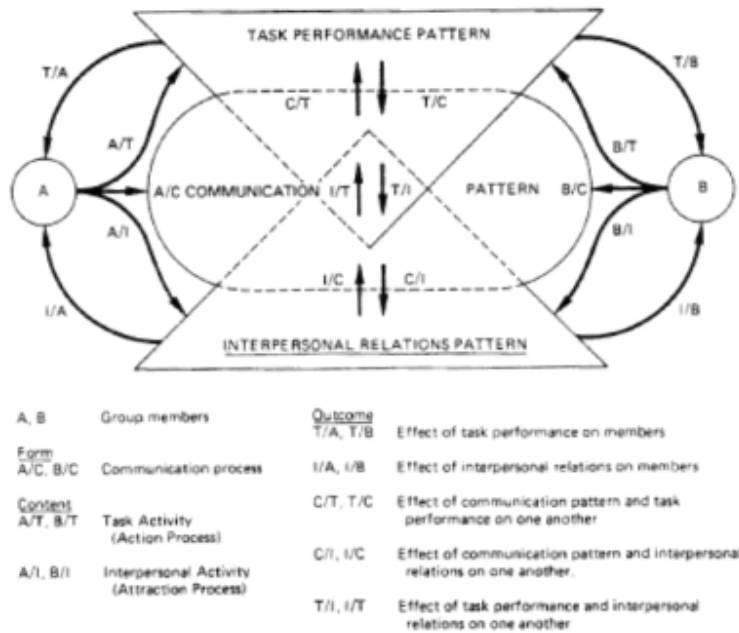
Source: (McGrath 1984)

Even though the focus on this study is on a more overall picture of communication inside an organization, the whole picture is still built up from single one time communications. Therefore it is also relevant to understand how this happens. These small communications build up how effectively communication technologies are used in organizational communication. McGrath's study provides an excellent basis for this.

2.4.2 Defining Task and Task-Media Fit

To examine tasks and to be able to combine them with the introduced media trait theories, we have to state how task is defined. According to Zhang, one cannot ever predict the performance impacts of information systems without an analysis of the task, and of the functionalities of the technology (Zhang, Galetta 2006). Previously we identified the technology capabilities defined by Dennis (Dennis, Fuller & Valacich 2008). In the following sections, we will present the definition of task that will be used in the research phase. We will also briefly introduce a work where task and media have been combined.

When studying group behaviour of groups, McGrath also paid a special attention to constructing a unified view of classifying tasks. Even though there are several other classifications of tasks, we will introduce McGarth's task circumplex as a starting point. In his work, McGrath proposes the division of tasks into four groups: *generate, choose, negotiate* and *execute*. These are all divided into subgroups and altogether they form eight different types of tasks. In this section, we will briefly explain the rationale behind the division of task and in the following section we introduce a theory that can be applied to organizational context. (McGrath 1984)

Figure 9: Task Circumplex
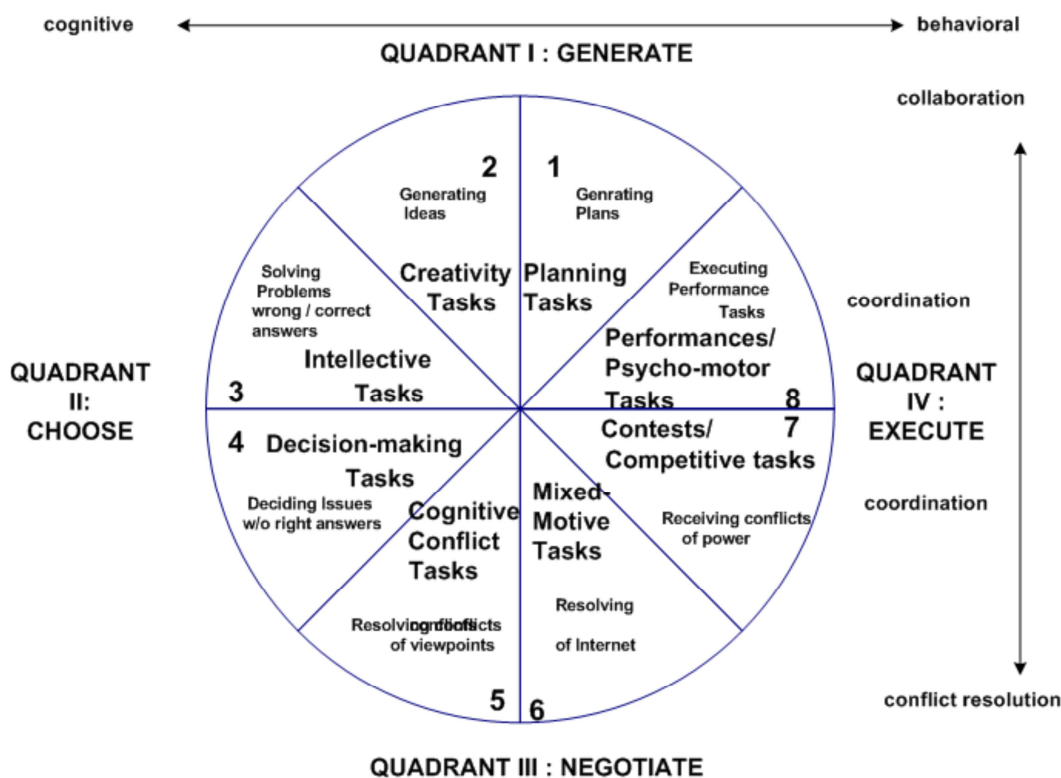
Source: McGrath & Hollingshead 1984

In his unifying article on task types, McGarth divides tasks into four quadrants. In his model each quadrant is distinct of others, but also has some relations to connected quadrants. The first quadrant, *generation*, means generation of both plans and ideas. Generation of plans is very close to coordination. Therefore it is closely related to the actual performance of these coordinated tasks. Generating ideas, on the other hand, implies a greater cognitive effort and a need to create ideas. That moves it closer to

solving problems. *Choosing* consists of solving problems and making decisions. Intellective tasks refers simply to solving problems with a clearly definable correct answer, whereas decision making is more a function that is gathering a sufficient amount of information and deciding on the best and agreed answer. This closely relates to resolving conflicts of viewpoints and judging on relational issues. These both are seldom issues with absolute right answers. Resolving conflicts of viewpoints and interest are located in *negotiation* quadrant. Conflicts of interest differ from conflicts of viewpoints that there is often a zone where some degree of agreement can be reached. The final quadrant, *execute*, consists of resolving conflicts of power and executing performance tasks. The former is related to conflicts of interest since competitive tasks often tend to have hidden agendas and their executions can be more complex than anticipated. The final section is execution of everyday tasks and is closely related to planning and coordination.

In their later work, McGrath and Hollingshead (1993) also combine the introduced circumplex on task types with Daft and Lengels (1987) Media Richness Theory. In their work, McGrath and Hollingshead argue that certain task types need certain amounts of media richness for the group to perform efficiently. For example, generation and coordination need less rich media than decision making. On the other end, tasks that require a lot of negotiation require media that is rich in nature. (Hollingshead, Mcgrath & O'Connor 1993)

Even though task-media fit aims to identify an optimal matrix to fit task with the media channel, the authors also recognize that people and technology usage are not constants. They acknowledge that both individuals and groups adapt to the use of a specific technology and that this may change over time. Generally, this means that certain media's capability to carry rich media will differ depending on the experience of the users. On the other hand, a specific media can also be used more efficiently and "unnecessary" information can be avoided.

Figure 10. Task-Media Fit

Task Type(s)	Computer Systems	Audio Systems	Video Systems	Face-to-Face Communications
Generating ideas & plans	Good Fit	Marginal Fit Medium too rich	Poor Fit Medium too rich	Poor Fit Medium too rich
Choosing correct answer: Intellective tasks	Marginal Fit Medium too constrained	Good Fit	Good Fit	Poor Fit Medium too rich
Choosing preferred answer: Judgment tasks	Poor Fit Medium too constrained	Good Fit	Good Fit	Marginal Fit Medium too rich
Negotiating conflicts of interests	Poor Fit Medium too constrained	Poor Fit Medium too constrained	Marginal Fit Medium too constrained	Good Fit

Increasing potential richness required for task success

Increasing potential richness of information transmitted

Source: (Hollingshead, Mcgrath & O'Connor 1993)

In this research tasks are seen as a combination of smaller tasks that can be identified as a larger part of a certain organizational process. McGrath's and Hollingshead's task definition is used in analysing the communication performance that happens in our target organization. After analysing the technologies and the capabilities we combine them with these tasks to understand the organization wide communication.

2.4.3 Time, Interaction and Performance

The previous two sections provide a good understanding on the micro level of communication and categorize the main type of tasks, but it lacks the link to the everyday communication we focus in this research. The micro view describes each small communication happening and is therefore a somewhat restricting level of analysis. The task cirumplex, even though being very relevant as categorizing tasks, does not provide a very useful tool to understand how tasks and communication technologies are used to achieve organizational goals. Therefore, we introduce a third model that describes the pieces that completing tasks is built on. The conclusion behind this theory is that most of organizational communication happens inside very temporal roups and the overall task is divided in multiple subtasks that are then performed in different ways. (McGrath 1991)

In his Time, Interaction and Performance (TIP) theory, McGrath proposes a new way of how organizational task are performed by groups to achieve organizational imposed goals. The performance of a group is constructed of functions and modes. These are in some combinations performed as purposeful activity. This purposeful activity happens in three levels: *projects*, *task*, and *steps*. *Project* is a mission for performing a set of activities in the service of a goal or goals. A *task* is a sequence of activities instrumental to completing specific projects. In our view communication and using technologies are a very essential part of performing these tasks. Lastly, *steps* are smaller parts of a project. A single communication can be seen as a step.

First he proposes that groups are multifunctional and each function McGrath describes contributes to the system in different ways. The three possible functions that groups are engaged are: *production*, *member support* and *well-being*. The *production function* includes all the purposeful activity that is conducted to reach the organization goals. These are divided to projects that describe the existence of the group, to the tasks that are required to complete the project and steps that are proper parts of the task. The two other functions are seen as having a more social impact. The *member support function* consists of resolving issues within the group and coordinating how the group will work to succeed in the project. It is the relation between members inside the groups. The *well-being function* concentrates on the relation between the individual and a group. Not all members of the group have the same role within a group and the well-being function asserts what kind of a role, and in what extent, a certain individual has in a group. (McGrath 1991)

The second variable in his matrix is the different modes that describe the different phases that are necessary for a group to achieve its goals. These are closely related to the task circumplex introduced, but are more result driven. These modes are defined for each of the above mentioned functions.

In the production function, *inception* is the first mode and makes up for the creation of the group and the statement of the goals to be achieved. Also, a general guideline of how and what will be done to reach the goals is produced. This mode is evident in every

group since without it the group does not exist. The second mode is *problem solving*. If the existence of the group has a complex problem to solve, some measures to solve this problem have to be decided among the group. Basically this includes the technical issues of a goal achievement. The coordination of the processes and more concrete means to solve the problem at hand are created. The third mode, *conflict resolution,* is engaged when there are conflicting preferences between the members. When people are present and engaged in communication with each other, there are always value and power differences that have to be resolved. In the function, the political aspect of possible conflict is dealt with. The last mode in the product function is *execution*. This refers to the attainment of organizational and group goals that were decided in the inception stage. (McGrath 1991)

The same modes can be found on the other two functions, but instead of being goal oriented it focuses with developing and maintaining the group. In the well-being function, the *inception* mode consists of choosing the interactions needed to initiate the group work. The technical *problem solving* mode incurs acquisition of the know-how required to achieve the given goals. In the *conflict resolution,* the power and possible payoffs are allocated for the group. The possible conflicts between those that belong to the group and those that are externals for the group are balanced. On the last mode of *execution,* the employees carry out the interpersonal activities involved in the completion of the group's existence. (McGrath 1991)

The last function, the member support function, deals with the activities that have to do with members being embedded in the group. The *inception* mode defines how strong the ties with the employee and group are. It defines how much an individual participates in the group when it thrives for its goals. In the *problem solving* mode the positions and division of status occurs. Individuals are either assigned by the organization for a specific role or they can themselves thrive for a certain role. In the *conflict resolution* mode, a member of the group bargain for the amount of contribution needed from them and the payoffs they receive for the contributions. The last mode, *execution,* involves the member's concrete participation on group's activities. (McGrath, Hollingshead 1994)

Figure 11: Functions and Modes matrix

FUNCTIONS

	Production	Well-being	Member Support
Mode I Inception	Production Demand/ Opportunity	Interaction Demand/ Opportunity	Inclusion Demand/ Opportunity
Mode II Problem Solving	Technical Problem Solving	Role Network Definition	Position/ Status Attainments
Mode III Conflict Resolution	Policy Conflict Resolution	Power/ Payoff Distribution	Contribution/ Payoff Relationships
Mode IV Execution	Performance	Interaction	Participation

M O D E S

Source: (Mcgrath 1991)

As one can notice the modes are very similar in all of the three functions. The intention is not to have different types of modes for both functions, but the question is more about take a different perspective on the same things. The production function is concentrated on the performance indicators and goals that are to bed for a successful completion of the project. The well-being function describes what intangible organizational resources are allocated to the group and what types of roles are needed for the completion. The last function describes the choice that the group uses the resources provided to it to achieve the performance goals that have been set. (McGrath 1991)

Finally we examine the tasks, technology, technology capabilities and individuals in a wider organizational context. Here we combine all the previous theories to understand how they can be linked on how tasks that are performed in a company. We examine how certain combinations do or do not match with the TIP theory.

Overall, in this study MST will be used to analyze the communication technologies used in the case company. Goodhue's TTF (1995) and Dennis MST (2008) will be used to

compare how these capabilities will match McGrath's TIP (1991). This will be done similarly as how Dennis did in his MST research. However, we add an organizational level to the study. We also seek to find how the organizational environment in the company impacts the communication happening in the company. Desanctis & Pool's AST (1994) will be used for this.

3. Framework

To clarify the framework of this study, we describe the thinking used when examining the empirical research. The framework that will be introduced next describes the general viewpoints of approaching the research questions. By defining this, the main approach of the research is linked with the theories introduced. This will guide the reader on the mental model used in when conducting the research and analyzing the findings. We compose a process framework to link the research, conclusions and findings with the previous research. Whereas the technology framework introduces the general perspective of this study, the process framework helps us understand how the empirical study is connected to previous research.

3.1 Technology Framework

The theory background of this thesis comes from different viewpoints and the possible perspectives that could be adopted are numerous. Even though we want to be open with our research, we still have to constrain the research to gain relevant focus. Therefore we aim to narrow our view, by adapting a general framework, which will applied when analyzing the empirical findings. We intend to adopt a similar framework used by (Orlikowski, Gash 1991) and apply it to the context of ICT. Orlikowski et al. successfully keep the focus on their research on technology, while they still manage to study the organizational structures as complete entity.

The framework build up by Orlikowski is based on social cognitive research. The major premise of this is that people have certain interpretations of the world, and according to

these interpretations they enact in particular social realities and give them a meaning. In the social systems, people's interpretations interact in relation to each other. If enough members interpret a certain concept in the same way this can become embedded in the social group, and it becomes institutionalized. In a larger environment, this can also form a social reality (Berger, Luckmann 1967). Individual people conceptualize these constructed realities through a metal framework. Gioia describes these frames as those structures that help individuals to make sense about the social context they interact with: "Definitions of organizational reality that serves as vehicles for understanding and action" (Gioia 1986). This means that people have actually both individual and common beliefs of interpretations.

In their framework, (Orlikowski, Gash 1991) use this social cognitive model to understand how individuals use technologies and understand them in a social context:

> "We argue that an understanding of people's interpretations of a technology is critical to understanding their interaction with it. To interact with technology, people have to make sense of it; and in this sense-making process, they develop particular assumptions expectations, and knowledge of the technology, which then serve to shape subsequent actions toward it. While these interpretations become taken-for-granted and are rarely brought to the surface and reflected on, they nevertheless remain significant in influencing how actors in organizations think about and act toward technology".
> (Berger, Luckmann 1967)

Because social cognition can be discussed from different viewpoints, we want to stress that we will focus on the interpretation of how people see different communication technologies and what are the roles of different ICT in the target organization. This does not mean that we focus only on technology, but instead that we observe the assumptions, expectations and knowledge of the technology through the social nature of these technologies.

We aim to apply this framework to understand some of the socio-cognitive structures that are embedded in the target organizations. The structure will be built up from the premises of the users of the communication technologies available in the target company. The goal is to approach the communication patterns from the viewpoint of the user and understand some of the reason of how and why people use certain technologies. These finding will then be reflected back to the theories introduced in the previous section. Through this technology frame we also aim to understand why individuals and different groups inside the organization use different means of communication during their workdays.

3.2 Process Framework

To understand better how previous research is combined with our study, we build up a process framework. In the introduction part, we provided an overall research goal and questions for the study. Each of these focused of a different area. The first question examines the communication technologies used in the company. The second and third question then focuses on how these are used in an organizational environment to acquire performance gains. These three questions are also used to organize the study.

Figure 12: Process framework

	Available technologies	Communication fit	Performance effects
Research goal	Available technologies	Communication fit	Performance effects
Theories	Information system theories	Media trait theories	Communication in organizations
Empirical focus	Selection of technologies by • Task characteristics • Individual characteristics • Technology characteristics	Contextual characteristics • Situation • Capabilities	The effects of the use of communication technologies on individual workers' productivity

Each of these questions is connected to a set of theories. Information system provides us with the inherent technology traits and how these are connected to an individual user. In the beginning of our empirical part we examine the tasks and technologies used in the target company. These are strongly supported with the information system theories. The goal is to understand what tasks are performed and how the technologies and users themselves bring support to these tasks.

The communication fit focuses on how the capabilities of are used in communication situations. The media trait theories provide a foundation on how communication technologies differ from the more traditional information technologies. The research aims to use these media traits to examine how communication happens in the target organization. By combining information system theories and media trait theories we create an approach to analyze the communication performance.

In the performance section on the empirical part we connect the individual and the technology usage on how tasks are performed in the target company. In most cases a single communication is a part of performing a larger task or set of tasks. Therefore we aim to study how these larger sets are performed and how the communication technologies introduced support them,

In the final part of the empirical study we accept the fact that the introduced model does not operate in a vacuum, but the organization itself can play a role on how the technologies are used to create performance result. Therefore we examine how the target company tries to impact on how individuals use communication technologies as part of their work. We also examine how the use of communication technology could be altered by the organization.

4. Methodology

This study aims to examine how the issues brought up in the literature review occur in a contextual setting and a defined environment. To link up the literature review with an economical setting and the individuals in their work environment, we need to approach

the everyday context where this happens. Therefore, we construct our research according to this. The rest of this chapter describes the chosen research methodology and defines the approach chosen.

4.1 Research Method

Case studies, as a research methodology in the IS field, have faced critique in past. For example, (Benbasat, Goldstein & Mead 1987) claimed that IS case study investigators had a history of ignoring methodological issues, and a failing to specify clear objectives. Also, (Yin 2003) states that many times case study investigators fail to follow systematic procedures and allow evidence or biased views to influence the direction of findings. Anyhow, there have also existed strong arguments why in some cases a qualitative case study can prove to be better than a similar quantitative approach. In some cases, the complexity of multivariate research methods, the distribution restriction inherent in these methods, the large sample sizes and the difficulty of understanding and interpreting the results can handicap the use of quantitative methods (Benbasat, Goldstein & Mead 1987). During the past decades, the reputation of case study has improved and today it is an accepted research method in the IS field

The past decades have also witnessed a change, where the IS field has moved from a technological focus to a more and more managerial and organizational focus (Benbasat, Goldstein & Mead 1987). Paré (2004) agrees with this reasoning and continues that the goal of IS discipline is the study of information systems in organizations, where the weight is more on the organizational aspects rather than technical issues.

Another reason to use a case study methodology in the IS discipline is simply because of the phase of the technology change. Practitioners tend to implement a new technology before researchers have the possibility to offer advices or propose changes (Benbasat, Goldstein & Mead 1987). In this environment, case study offers a tool to conduct descriptive research on how these technologies are used by practitioners, and by doing this, to gain an opportunity to analyze how things are and how they could be improved. The environments where practitioners are studied tend to be complex and

context dependent. In his article, Paré (Paré 2004) identifies four reasons why and when case study is a viable choice:

1. the existing body of knowledge is insufficient to permit the posing of causal questions;
2. when a holistic, in-depth investigation is needed;
3. when a phenomenon is broad and complex; and
4. when a phenomenon cannot be studied outside the context in which it occurs.

Another concept that requires clarification is the approach taken when the research is conducted. According to (Braa, Vidgen 1999), these can be divided into either positivist or interpretivist. In positivist approach the object of research is studied objectively and rigorously. The environment should be a laboratory type and all intervention should be controlled. The interpretivist, on the other hand, sees these natural science methods inappropriate. (Hirschheim, Klein & Lyytinen 1996) argue that that IS development in its nature is contingent, socially situated, and politically loaded and therefore needs to be grounded in theories of social action. Therefore, the goal is to understand the context where the study is conducted in and the constraints are relaxed by understanding that objectivity simply cannot be assumed and that single factors for and outcome cannot be identified.

Finally there has been discussion about hybrid case studies that are not necessarily any of the three ideal research methods presented in the picture below. Braa (1999) argues that the three methods – change, prediction and understanding – result from different approaches. *Prediction* reduces the objectively gathered data so that reliable conclusion can be made. In *change,* the researcher intervenes with the research to produce an intended change. *Understanding* is acquired by observing the organization and as an outsider by building a holistic understanding of the case. The three hybrid methods are located between these ideal types. (Braa, Vidgen 1999)

Figure 13: Research methods

Source: (Braa, Vidgen 1999)

We acknowledge that this research poses a problem when considering the research methods. The ideal soft case type can be threatened considering the researchers were working for the target company for the time of the research. By working for the company and conducting research for the company, as well as for ourselves, we do provide the company with advice and recommendations. By doing this, we move from the soft case towards the action case. We still conclude that the case method suits the research better than an action case. We judge that the advice given is more in the form of interpretations of the situation than offering a solution in the form of what should be done.

Overall, this research is conducted as an interpretive single case research. It is conducted in the natural setting of the case company. It also uses multiple data collection methods, including both qualitative and quantitative methods. Despite the study being interpretivist, we apply surveys to support our primary data from interviews. Surveys are traditionally seen as more related to positivist scientific tradition because they are often conducted in controlled environments (McNeil, Chapman 2005). Overall, the research is conducted in an exploratory fashion and gives us the possibility to find answers to both why and how questions. The primary data is gathered through interviews and supported with secondary data, mainly surveys. The data gathering

focused on the individual that was the unit to be analyzed. The research was conducted in a subunit of our case company and it concentrated on the individuals working in the subunit.

4.2 Data Collection

The case study was conducted within a six month time period in 2010, extending from June to November. In the setting, the target company was preparing to launch a new communication technology, Microsoft Office Communicator (Microsoft OSC or OC), but this was not yet made public. Microsoft OSC is a communications application which enables end users to communicate and collaborate easily with others using various communication options, including instant messaging, voice, desktop sharing and video.

The data collection took place at the target company's facilities in Helsinki and was conducted by three individual researchers during the time mentioned. The data was gathered in two surveys and two questionnaires during the time.

4.2.1 Information gathering

Before the actual collection of data, there was an approximately one month time period which was used to understand the background of the topic and to examine previous literature conducted on similar topics. The area to be researched was identified by the target company and a broad definition and scope for the findings was introduced. Also some material was provided by the target company, but familiarizing with the research area was mostly left on the researchers.

During the time period of June-July, a preliminary research design was articulated to support the following steps and to provide a blueprint of what was to be researched. Before the design of the survey, a study proposition was written so that there would be a clearer focused on how the surveys should be designed. A basic reference point also helped to direct the efforts to understand what previous research could be linked for the

questions to be answered. The unit to be studied was also narrowed down to consist of the subunit of the target company.

Before the first survey, a summary of previous research was written down to guide the following data collection phase. According to (Yin 2003), in case study it is essential to develop a theory prior to the collection of cast study data. Therefore the time prior to the actual research was used to gain an insight in the prior research. This insight was the used to build up the surveys and questionnaires that were conducted. The results of the first survey and questionnaire were also used to reassess and redefine the following survey and questionnaire.

4.2.3 Interviews

One of the most important sources of case study information can be gathered by interviews (Yin 2003). This is especially true in a case that is interpretive and gains to acquire a holistic picture of the topic. To be successful in his/her research, the researcher must gain an in depth knowledge of the unit to be studied. This is exactly what interviews offer.

A set of interviews were conducted in the target company. The first set of interviews was conducted between 16 August and 30 August 2010. The questions were designed based on the literature that had been studied up till the point and any relevant input that was acquired from the conducted questionnaires. The questions were built up to satisfy the needs of three different researches, so they were composed of three different viewpoints on the subject to be studied. All of the researchers concluded that a relatively unstructured interview would be the best approach. This was because we expected the interviewees to be relatively open on answering the questions. Despite an open style, a structure was developed to guide the interview and ensure that all areas of interest were examined.

Before the first interview, one test interview was conducted to test up the questions that had been built up and train on using a recording device. The questions were already

screened to get rid of possible redundancies. The interviews were conducted with always having two of the three researchers present to achieve a more relaxed atmosphere. All of the interviews were recorded and all the interviewees were comfortable with recording the situation.

The interviews were analyzed afterwards by listening to the recordings. The notes of each interview where the compared with each other to find possible similarities. These where combined with the result in the questionnaire to provide sufficient data to form the basis of the empirical findings in this thesis. The primary data source in this research is the composed of data gathered from both the questionnaire and the interviews-

4.3 Validity and Reliabiy

Validity and reliability are the greatest concerns when discussing the quality of the research performed. The research should represent a logical set of statements and the quality of the study can be judged testing how this is true. (Yin 2003) offers four factors that can be tested to assure the quality of a research:

1. Construct validity
2. Internal validity
3. External validity
4. Reliability

The first, *construct validity*, addresses the problem of producing enough evidence for drawing conclusion. Therefore, the researcher should set a clear goal of what is to be measured and provide enough of relevant measures to observe the setting. In order to increase construct validity the research should multiple sources of evidence (especially during the data collection). The second tactic is to create a chain of evidence during data collection. The third tactic is to have the draft case study reviewed by key informants. In this research the main focus was to utilize the first two methods to increase the construct validity (Yin 2009).

Internal validity is used to establish casual relationships between occurrences and conclusions. It is used to confirm that certain condition actually lead to certain condition and can be distinguished from spurious conditions. Internal validity also addresses the issue of the researcher to intervene with the research environment. It must be understood that while making a contact with the environment the researcher has a potential to have an effect on the results. In this research explanation building was used to increase internal validity (Yin 2009).

External validity deals with the ability to generalize the findings of the research. Within the scope of this research is extremely difficult to build a thorough theory that could be tested. To increase this validity, several other researches where conducted along with the one being addressed. Part of the findings of this research where publish along with a larger publication analysing single workers productivity (Yin 2009).

Reliability addresses the issue that the same results should be achieved by another researcher studying the same subject. In other words, the goal is to minimize the biases imposed on the research by a single researcher. To achieve this documentation of the research should be done as precisely as possible. This provides a good picture on what the researcher has actually done and somebody else, following the same procedures, can reproduce the same study. To assure this, the appendixes included should provide documentation on the questionnaires and interviews that where conducted.

5. Empirical Study

Analyzing the empirical findings was divided in to two main sections. The first part uses Goodhue's (1995) TTF, Dennis & Fuller's (2008) MST and McGrath's (1991) TIP theories to understand what communication technologies are used and to what type of tasks. This is also complemented with an analysis on how specific situational factors impact the relation between and communication technology and task.

The second part will add the organizational layer on top of the single individual's communication occurrence. Since communication technologies always involve more than one person interacting with the technology, this also has an impact on how the usage of the technology occurs. For this analysis we use Desanctis & Pools AST (1994).

5.1 Case: TeliaSonera

TeliaSonera is a Nordic mobile network operator that provides network access and telecommunication and TV services in Northern Europe, Eastern Europe, Central Asia and Spain for both private and business users. Its headquarters is based in Stockholm and its stocks are traded on the Stockholm Stock Exchange and on the Helsinki Stock Exchange. Lars Nyberg is the CEO of TeliaSonera.

The company was established in 2003 after a merger between the Swedish and Finnish telecommunications operators, Telia and Sonera. The ownership of the shares is divided as follows: 37 % are owned by the Swedish government, 13.2 % by the Finnish government and the rest by institutions, companies and private investors. During the year 2010, the average number of full-time employees was 27,697 out of whom 4,686 were based in Finland. The net sales in 2010 were 106,582 MSEK and net income 23,562 MSEK. The key business ratios of TeliaSonera during the last five years have been as follows:

	2010	2009	2008	2007
EBITDA margin (%)	34.7	33.6	31.8	32.2
Operating margin (%)	30.1	27.8	27.7	27.1
Return on sales (%)	22.1	19.5	20.7	21.1
Return on assets (%)	12.7	11.8	12.7	13.1
Return on equity (%)	17.8	15.2	17.2	18.6

These ratios show that 2010 was a successful year for TeliaSonera. The revenue growth improved throughout the year and earnings per share increased by 13 percent

during the year. EBITDA, excluding non-recurring items, was the highest ever reported by the company.

This study focuses on TeliaSonera's employees based in Finland and working in its Business Unit Services (BUS) subunit and communication channels offered by the company for them. TeliaSonera invited us to conduct research to complement their own research. They were conducting simultaneous research outside the company on similar areas and the findings of these different research tracks were combined. As a result, a book called "Uuskasvua ymmärtämässä – kutsu kestävään tuottavuuteen" was published (TeliaSonera Finland Oyj 2010).

5.2 Communication media

The first part of the research was to identify the current situation and to examine how the current communication technologies are used inside the target company. The existing situation was analyzed to identify how much and what ICT technologies employees use to communicate. These will be reflected to the MST and TTF to compare the selection of communication technologies with previous research. Individuals' comments will be analyzed to find out how they feel about the properties of communication technologies and what are the most important factors affecting the choice of the media to be used.

4.2.2 Questionnaire

During the research, a questionnaire was conducted to the subunit that was studied. Questionnaire was seen as a relatively quick way to collect data and was considered easier for the target audience, since less time is associated in completing the questionnaire. It was also seen attractive to gather some statistical data over the subunit that was researched. The questionnaire was designed in cooperation with the researchers and the target company and mostly included questions proposed by the researchers, but also some questions were added from the company's part. The

answers received provided us with some background information that supported us in building the questions for the interviews.

The first questionnaire was conducted between 11June and 8 September 2010. It was performed in the Business Unit Services (BUS) subunit of the target company. Before launching the questionnaire it was tested on a few people and a pilot questionnaire was performed to a few users that were already testing Microsoft OSC. This provided an opportunity to receive feedback on the wording and placement of the questions. The questionnaire was semi-structured including both open and closed questions. This was done to avoid biasing the questions with the researcher's logic. Largest part of the questionnaire was performed from structured likert 5 scale questions. Only two open questions were included, but their main reason was to gain some understating on how the respondents feel about communicating in the target organization.

The pilot questionnaire done before the first questionnaire was sent to 71 individuals working in the BUS Business Unit Service subunit and a total of 38 responses were received. The response rate was 54 %. After some slight modification, the official questionnaire was sent to 220 individuals in BUS and 113 completed questionnaires were received. The response rate was close to that of the pilot and was 51%.

The different answers in the questionnaire were analyzed according to different background to find possible correlations. All mean calculus was presented for each questions. Also, a cluster analysis was performed to find potential groupings with the same answers. The open questions were decoded to find patterns in the answers. As a restriction, the open questions were answered only by some of the respondents so the size of the sample was somewhat smaller than that of all the respondents.

5.2.1 Information Communication Technologies Available

To understand what technologies were available in the organization, the question about communication technology usage was introduced in both the Intranet questionnaire and the interviews. Most of the common communication media was presented in the questionnaire and a few additional communication channels came up in the interviews.

We also included face-to-face meetings in our examination to offer a commonly used communication channels as a reference point. According to these, we can state that most communication in the case company's BUS unit was conducted through the following channels.

Email: As a communication technology this was mentioned in all interviews. In most cases, the interviewees saw this as the single most important communication technology used in daily business communication. When asked how often it was used, the average was 4, 89 (Likert-scale 0 being not used and 5 being very often). On the average, the employees used daily 2,69h of time processing emails. Up to some degree email was also used by phones.

Phone: Phone was seen as the other very important ICT technology and was mentioned in every interview. It was used almost as often as email, reaching an average of 4,82. In the case company, phone was understood as being as a cell phone that every worker had. The cell phone use could then be modified to some degree. It could only be used to call, or it could also include the use of SMS and email. In this analysis, phone as an individual communication is seen only as the traditional one-to-one communication channel and other ICT technologies are seen as the extension of its traditional use.

Instant Messaging: The use of IM was very variable in the case company. From the interviews, three users used it actively, three mentioned using it once in a while and three stated never using the technology. Support for this finding was also provided in the questionnaire. An average of 3,21 was achieved when asking how often IM is used. The standard deviation of 1,24 indicated that there existed users that either used actively or did not use at all.

SMS: In the interviews, SMS was not mentioned when asked about the most common ICT technologies. but in many cases it popped up later on in the questionnaires. In my opinion, this was because SMS was seen as intergraded to the cell phone and being part of it. This can be confirmed by the questionnaire where

SMS had an average usage of 4,11. This indicates that use of SMS is relatively common in the organization.

Tele- and Web conferences: In the interviews, these positioned to be a technology that was used on daily basis. Some seemed to be using more telephone conferences where as some seemed to have more net conferences. In this case it also seemed that some interviewees saw teleconferencing as a part of cell phones' functionality. This was not included in the first questionnaire.

Video conferences: Video conferencing was separated from the previous two since these were done on special rooms designed for it. In the interviews, over half answered that they use videoconferencing (5/9). In the questionnaire, an average was 3,03 which indicates that most people used it at least once in a while.

Workroom: From the interviews we found that almost half of the respondents used workrooms as a means to communicate (4/9). It was a common tool that was used as a virtual workplace where materials could be collected and stored to. The access could also be restricted and specified. Due to the researchers not being familiar with the concept before the first questionnaire, this was not included in it. To acquire some statistics on how often this was used as a communication method it was included in the second survey and gained an average of 3,34 with a standard deviation of 1,09.

Intranet: Intranet was acknowledged as a used ICT technology by most of the interviewees (6/9). In the questionnaire, it was perceived as a relatively common tool having a average of 4,42. The standard deviation was 0,91so this indicates that according to the questionnaire most users were familiar with it and used it up to some degree.

Sales support system: Before the interviews, the researchers had very little understanding of this system's existence and how it works. In the interviews, it became apparent that this was used as IS system to support sales people. It was

therefore used by the sales people and their support personnel. This will not be analyzed as a communication channel, but it was worth mentioning that at least some interviewees felt like, up to some degree, that it had the properties of a communication channel.

Face-to-Face meetings: These were a common way to communicate in to company both formally and informally. According to the questionnaires, formal meetings reached an average of 4,15 and informal conversations an average of 3,7. Also, the interviews confirmed that both of these were relatively common in the case company.

From these above mentioned communication technologies, we include all but the sales support system in our analysis of the capabilities they provide for communication. Even though some of the interviewees saw that the support system provided communication properties, we set it apart from the other communication possibilities and therefore exclude it from our analysis.

5.2.2 Analysis of Technology Capabilities

Several of the theories introduced assume that technologies have some inherent capabilities to support the employees work, and in this case, communication. TTF describes the role of technologies in information systems as being computer systems (hardware, software, and data) and user support services (training, help lines, etc.) that assist users in their tasks (Goodhue, Thompson 1995). MST describes communication technologies as those media capabilities that the electronic channels provide and superficially examines the fit between a channel and the purpose of communicating (Dennis, Fuller & Valacich 2008). Dennis observes the capabilities of technology as the potential structures provided by a medium which influence the manner in which individuals can transmit and process information (Dennis, Fuller & Valacich 2008). To analyze these properties in the communication technology contexts, and how they exist

in the target company, we compare these theories with the experiences of the users and the above technologies that are available in the companies' media repertoire.

To analyze the communication technologies used in the target company, we adopt the media capabilities introduced in MST. The capabilities that we analyze are: *perceived velocity of communication, reprocessability, level of interactivity, rehearsability, parallelism* and *symbol sets*. The *perceived velocity of communication* is seen in slightly different perspective compared to MST. In this case communication is not only about the pure technology based speed that the technology offers, but also how fast the users envision it to be. *Reprocessability* is defined in very much the same manner than in the MST. We observe how important is the ability to be able to re-examine the message that is to be sent and which technologies offer this possibility. Documentation is also part of this capability. We see the *level of interactivity* as an important addition to the capabilities. In our analysis we want to stress how the users of the technologies perceive the interactivity. *Rehearsability* is seen as the ability to consider what the sender is actually sending. The concept is same as in MST, but we are also trying to understand how much the users actually consider what they are sending. *Parallelism* is seen as how much different technologies provide the possibility to use several communication channels at the same time. We also studied how much this sort of multitasking happens in the target company. *Symbol sets* are treated in the same way as in MST. We aim to examine how the sets of symbols of different capabilities are observed and used.

Table 1 Media Capabilities

	Velocity of Communication	Reprocessability	Rehearsability	Reachability	Parallelism	Symbol sets	Interactivity
Phone	Fast	Low	Average	One-2-One/One-2-Few	High	Low	High
Email	Average	High	High	All	High	High	Low
Email on phone	Fast	High	High	All	Average	Average	Low
Workroom	Average/Slow	High	High	All	High	High	Low
Videoconference	Slow	Average	Average	One-2-Few	Average	Average	High
Intranet	Slow	High	High	One-2-Many	High	Average	Low
F-2-F	Slow/High	Low	Average	One-2-One/One-2-Few	Low	Low	High
IM	Fast	High	Average	One-2-One/One-2-Few	Average	Average	Average
SMS	Fast	High	Average	All	Average	Lowq	Low
Teleconference	Average	Average	Average	One-2-One/One-2-Few	Average	Average	Avearge
Meetings	Slow/Average	Low	Average	One-2-One/One-2-Few	Low	High	High
Netconference	Average	Average	Average	One-2-One/One-2-Few	Average	High	Average

The table presented above is constructed from the inherent technology capabilities that the different media used in the target company have. These are not necessarily how these communication technologies actually are used in the target company. The goal of this stage is to compare these estimated capabilities with how the users of these technologies see them. It is not meant to provide the ultimate right picture of what capabilities these technologies have, but rather describe how the users of our target company perceive them. In a way we have unified the positivist approach of the MST and interpret how this fits the real world case. Therefore, we will take the technologies into examination one by one and see how the actual use compares with the capabilities presented in MST. Not all capabilities are fully covered.

Email

Email has become one of the most used communication technologies in today's organizations. This has been mostly due to its possibility to disperse time and location (Hooff 2005). Velocity of communication is seen as being average, or fast when using the phone email version. This is pretty much confirmed in our research. People tend not to use email when they are in hurry or completing other tasks. The exact time for an answer for email ranges from few hours to maximum of one workday. This also confirms that there exists some individual variance on how people see the perceived velocity. The expected time for an answer is not only due to the technical capabilities offered, but rather on the individual perceptions of the communication velocity and the organization wide social norms addressing the time it is seemed appropriate to answer an email. One of the problems with email as a communication media is just here, as one of the interviewees commented: "You can never be sure when your email is responded to". On the contrary, one the interviewees claimed that: "At the moment, email seems to be the best way to receive a quick response". This suggests that the perceived velocity of communication can differ in a significant ways.

The table also suggests high values in reprocessability and rehearsability. Reprocessability was seen as one of the most important capabilities that email offers. 8/9 interviewees reported that simply because of the possibility to document messages

they use email. One of the interviewees addresses the issue buy telling us that email is a very good archive and that he has over 20 000 email messages stored there. One can argue is this the initial purpose of email, but nevertheless it is a very used capability. Also 6/9 interviewees expressed that email has the capability of rehearsability. It was defined as the possibility to leave a written message in the background for a while and came back to it later to ensure you are sending what you really want to tell. Email was also seen as a technology that enabled the writer to carefully consider one's message. One interviewee explained that: "In only written communication you can be sure about sending exactly the information you desire".

Email was also seen as the most used channel when a large audience was desired. 7/9 interviewees identified that email had the property of reaching large masses when communicating. Parallelism and interactivity received relatively little comments or support. We interpreted that this lack of interactivity might be because of the trade-offs described by Dennis. According to MST, conveying large amounts of information is best suited with a media low on interactivity (Dennis, Fuller & Valacich 2008). The fact that nobody saw email as being interactive, but instead used it to document and reach large masses would support this notion. A few of the interviewees also mentioned that it is common to write SMS during meetings. Short email responses can be used in a similar fashion. This would indicate that email has some degree of parallelism. Symbol sets were also mentioned by one interviewee, who claimed that email is good for including attachments.

Phone

In our target company mobile phone was a communication tool provided to each employee and it ranked second as the most used communication technology inside the organization. In terms of velocity of communication, it was seen as the fastest way of reaching your audience. 4/9 of the interviewees reported that the phone had the property of being a fast media. It was also seen as an easy way of communicating. As one of the interviewees claimed: "I will choose the phone if I am in a hurry or feel just too lazy to write anything down". It was somewhat evident, because phone is a common

company-wide tool, some communication that might have been better through other technologies was done through the phone. This was because of the familiarity and the situational reasons that will be discussed later.

The biggest problem with the phone was not always knowing the other partner's current status. In accordance with the questionnaire, the employees had an mean of 2,33 meetings per day. These took an average of 10,73 hours a week. Depending on the type of meeting the other partner is having, these impose restrictions on the reachability. 3/9 mentioned that the phone is somewhat problematic since you cannot always be sure if the other partner is reachable by phone. Comments such as, "you can't always answer your phone" and "phone is an excellent device, but you cannot always reach people with it", were received in the interviews.

Comparing with the most used communication tool, email, there was little responses describing the phone as having the capabilities of reprocessability and rehearsability. This sounds intuitively correct since calling and talking to somebody on the phone is high in interactivity. As mentioned with email, this also supports the fact that the same technology cannot excel in both being interactive and supporting reprocessability and rehearsability. Therefore, interactivity was reported to be high with mobile phones. According to one interviewee, "Phone and SMS enable fast feedback and interactivity."

Phone, seen as a means to communicate one-to-one with another person lacked also the features of parallelism. Nobody mentioned that phone would have the features of parallelism. It is easy to understand that when one is on a direct communication with another person, he/she lacks the option to engage in another communicative action. Symbol set also was neither mentioned as a capability for a one-to-one communication.

Instant Messaging (IM)

Instant messaging was used in a very variable way, but among the interviewees we managed to gather different types of users. Before the OSC implementation, the instant messaging tool used in the target company was Microsoft Network (MSN). All of the

interviewees were aware that IM exists as a used communication technology inside the company. As mentioned, three of these nine mentioned that they use IM actively, while three mentioned using it never and the last three used it once in a while or only with some people. This is very much in line with the result from the questionnaire, some people use it a lot and some people hardly at all.

When comparing the result with the background information, we can observe that all of the active users were in the back office operations where as all of those not using it were located in a more customer oriented role. We argue that this maybe because of the differences in job descriptions of people inside the BUS unit. All of the three active users of IM where located in jobs that included much project type of work. Project work tends to need more of fast ad hoc communicating, and the interviewees confirmed that IM is a very good communication device when you want a fast response to a question that is easily articulated. In this case, there was no indication that communication toward customer would happen through IM and therefore the value of the technology for sales personnel can be assumed to be lower.

As a communication channel, IM was seen one of the fastest. If the communication partner's status information (available, away, in the meeting, busy or do not disturb) was up to date, the heavy users saw it as the fastest communication technology available. It was seen as an easy way to ask fast questions. One of the interviewees stated that if he is in need of some specific information, and the one he expects to be able to provide him with an answer is on available on the IM, he uses IM to gain the information. One of the downsides of IM was that, as stated, that it was not used by everybody. This caused reachability problems towards to non-users of IM.

The reprocessability and rehearsability were sparsely mentioned. One reason seemed to be that users actually did not know that IM conversations could be logged and one interviewee mentioned that he/she does not use IM because it does not have the option to document your conversations. In the analysis, documentation seemed to be closely related to reprocessability and rehearsability. Therefore, the reprocessability capability was not at the same level as with email. It seems that it is not only the inherent

capabilities that matter, but also how aware the users are of the capabilities and can they use it with each other. Rehearsability was neither seen as a capability strongly supported by IM, this is probably because the actual users of IM described it as being a more interactive channel than the pure technical capabilities imply.

IM was described as an interactive channel by two of the nine interviewees. They both stated that IM also makes it possible to gain fast responses. One of the interviewees stated that IM cannot simply be used in the same way as email. Using email for the same type of conversations as IM would just cause an email flood. This again supports the fact that both reprocessability and reherasability do not match with a channel being highly interactive. We also estimated that there would some parallelism elements in IM, since while being interactive the communication speed is lower than on phone or video. We had some answers indicating this capability. There were answers indicating the IM could be also used during a meeting or while being on a phone. One of the users said that she uses much IM to communicate with the case company's other unit. She used it to communicate symbol sets to describe and explain what was discussed in words. Therefore, we note that the bias of receiving most of the answers from heavy users might indicate the use of IM be more interactive than it is to the average user.

SMS

In general, SMS was probably seen as the fastest way to reach a person. A few interviews explicitly answered that it is faster than IM. This was due to the fact that cell phone was seen as a device that everybody carries along with them and answering to a SMS was seen appropriate in most situations. In the target company, answering a SMS during a meeting was not seen as being rude. Instead, SMS was considered as a technology that was used to confirm something or as seeking for an answer for a short question. But even with a very used media, such as SMS, one interviewee mentioned that he never reads them, only deletes them once a week. This again indicated differences in personal ways of communicating.

SMS is also seen as a written communication media that should, up to some degree, support rehearsability and reprocessability. In the interviews, there were little responses of these two capabilities being offered by SMS, even though the theory supports that these should be available. Only reprocessability came up by a single interviewee. SMS was mentioned to have the capability of reconsidering the message before sending it. Generally this is true, but it seemed that most SMS answers are done immediately after receiving a one and therefore there is scarcely time to reconsider the message.

We argue that this is because of two reasons. Firstly, answering a message is seen as a fast response and there exists only little time to consider what one is sending. Therefore, there actually is little time to thoroughly consider one's response. Secondly, the SMS length is somewhat restricted. This means that there actually exists little communication that should be documented and that the communication is also more informal and there exist less need to re-examine what you are sending. Therefore this is less about the capabilities that are inherently available, but more about how SMS are being used. In the target company, they are used in such a way that users often do not desire the possibility to re-examine, consider or the possibility to later come back to a given SMS.

While in our estimate SMS was not seen as being an especially interactive media, it was used in a more interactive way than its pure capabilities imply. This is because people use it as a very interactive channel, but only on issues that are low on complexity. One of the interviewee described a situation where while being in a presentation, they exchanged messages that discussed very shortly about what was the idea behind the presentation. This also indicates that SMS has the capability of being a parallel channel while being engaged in another task. Symbol sets were neither mentioned. The reason to this could be that in business use SMS are mostly text only communication.

Teleconferences and web conferences

Both teleconferences and web conferences were a common way of communication in our target company. On average, the employees had 2,33 meetings a day and 1,47 of these were other than face-to-face. These two technologies offer basically the same ways of communicating. The main difference is that you can include some of your computers capabilities to a web conference according to the used meeting software. The usage difference existed mainly on the level that web conferences were used more in internal communication whereas teleconferences were held by sales people for external communication.

The velocity of communication can be analyzed on two levels. The actual communication happens with similar velocity as phone. The difference is that there exists some lag between scheduling a meeting and actually performing the meeting. The more people are involved, the more scheduling is needed to match different people's time tables. This makes the communication velocity slower than in a simple phone call. On the other hand, when a meeting is scheduled, it ensures that most of the people needed are available.

In our research, we argue that these technologies would have the capabilities of having some degree of both rehearsability and reprocessability. This is because even though being interactive, it does not mean each member has to be engaged in the conversation at the same time. We argue that the social norms of the society have an effect on this. When being present there is a strong social pressure, in the name of politeness, to concentrate to the one speaking. This pressure is relaxed when you are not physically present. In our opinion, this results in these communications technologies having some degree of both interactivity and rehearsability and reprocessability. While others are communicating with each other, a single individual has time to observe and think what has been said and in turn what he/she wants to communicate.

These same reasons that move these channels away from being fully interactive provide them with the capability of parallelism. The ability of being not only aware of the

meeting going on, but simultaneously working on another issue on your computer is a straightforward result of the single individuals communication phase being slower. Symbols sets were a capability that a phone conference did not have, but are increasingly offered by net meeting software. One of today's software provides possibilities to present power points slides and share your desktop. Documentability was not seen a capability of the technologies. Some interviewees said that memos were kept up to some degree, but no written document was provided for all web conferences and teleconferences. Either way, the capability was external from the communication technology.

Meetings and videoconferences

Formal meetings and videoconferences were seen as rather fast ways of communicating. Formal meetings had the problem of being dependent of location, but once the meetings were held the phase of conversation was quick. Where web - and teleconference had only the time issue to deal with, formal face-to-face meetings have to deal with both time and place when organized. Videoconferences, at the time of the study, where organized through separate rooms designed for them. The problem with this was that in some locations these rooms just did not exists, and that there where too little of these available, so it made scheduling even harder. Some interviewees also mentioned that due to technical problems web- and teleconferences are a more reliable way of meeting up.

Meetings and videoconferences where seen as being the most interactive channel available. Formal meetings where clearly the most interactive, but some heavy users of video conferences claimed that they had become so accustomed to videoconferences that the difference to face to face small. Videoconferences were also stated as the second best in communicating meaning and they had been used for example in training on IT tools. On the other hand, some interviewees claimed that the contact and feedback to other partners is weaker than in a live meeting. In general, the opinion of the interviewees was that no technology can fully replace face-to-face meetings.

Despite this, the interviewees mostly agreed that videoconferences pretty well substitute face-to-face meetings.

Because these two ways were seen as the two most interactive channels, they should not support the capabilities of reprocessability and rehearsability. We argue that this is in fact the case. You do not have to spend so much time in thinking how you want to articulate your message since the other partner can immediately question you if he/she does not understand you. In other words, the noise explained by (Warren 1949) does not in exist in fully interactive face-to-face meetings. In fact, all the rehearsability and reprocessability done in media with lower interactivity is to lessen the possible misinterpretations occurring because of this noise.

In the form of symbol sets these where seen as the richest. Basically in both case you could bring any available technology or tool to demonstrate your issue. Similarly as with net meetings and telephone conferences, the technology inherently had no capability to document the issues being covered and this has to be done using other means.

Workrooms

Workrooms are not necessarily classified as being communication tools, but the interviewees mentioned it several times in the first set of interviews and in a way they do pose some capabilities that communication technologies do have. 5/8 mentioned it as being a used tool. In many ways the communication capabilities are similar to what email offers and they have been created to move some of the email communication to a better suited media.

Communication velocity is something that differs slightly from email. While email is a "push media" where information is pushed to somebody, this is not the case in workrooms. In workrooms, it is the receiver's responsibility to go to the workroom and acquire the information needed. In this sense, the channel is generally slower than email. On the other hand, as few of the interviewees mentioned, it does not work if people are not committed to using it. The main advantage is that this eliminates some

email traffic and lowers the chance that people just ignore it. The biggest reasons behind not using workroom seemed to be the problem distributing rights to all people involved in the project and simply getting everybody to commit in its use.

Reprocessability and rehearsability are also capabilities of workrooms. In this sense, they also provide the same possibilities as email, but they also help to link together different issues and allow better version control over a document than email. Therefore, the documentation capability is slightly better than in email. Actually 5/9 of the interviewees mentioned that workrooms are good for documentation. One interviewee described a situation, where because of the documents stored in the workroom, she had managed to back trace the steps of a project and gain understanding of the current situation, even though she had not been in the project from the beginning. This was because the workroom included the documents of previous steps. Parallelism capability is also high since there is no time pressure and you can simultaneously complete other assignments. Ability to reach large audiences is as well one of the capabilities offer by this tool.

Intranet

Intranet was recognized as an organization wide communication tool that was mainly used for general top-to-down communication. 7/9 of the interviewees described that Intranet is used once in a while and for a specific set of activities. The average use of it was 4,19 with a standard deviation of 1,02. This indicates that all the employees that answered the questionnaire were aware of Intranet and used it at least once in a while. Intranet was seen as a source of general type of information. It was referred to an endless swamp of information, but individuals still tended to agree that certain types of information can be found there. As an example one mentioned that Intranet proved useful when she needed help on absentee reporting. One of the employees also thought that the Intranet had more of a cultural meaning and is used to more communal communication.

For communication velocity, the Intranet was seen as slow. The type of information it was used to communicate was not very urgent and therefore people tended to use it when they had the time available or actually needed some type of general information from there. The problem of Intranet as a communication technology also lies in this property. If no urgency is created for the employees to find the required information, they might never acquire it. Having a slow phase of communicating also implies that the Intranet would have the capabilities of reprocessability and rehearsability. This seemed to be true and people used it to search and understand certain sort of general information

Interactivity level was also seen as very low as the Intranet was seen as a one-way information channel. It could also be argued that the Intranet offers possibilities for parallelism, but this was not described in the interviews as one capability. The reason might be that there was no actual need to use Intranet parallel to any other communication. Symbols sets were available in the Intranet and graphs, figures and videos were used to support the provided information.

Key technology capabilities

According to this technology analysis on the target company, we found three key technology capabilities that very much defined how different technologies were chosen. These were the interactivity, velocity of communication and need for documentation. In the open question of the first questionnaire, 35/69 (~50%) mentioned at least one of the above mentioned capabilities as affecting their choice of communication technology. Therefore, the technology capabilities do have a significant effect on what means is chosen for communication.

This thesis argues that the most important capability affecting the technology choice is the amount of interactivity that is needed. This is unlike (Dennis, Fuller & Valacich 2008) who claims that complexity, and due to this amount conveyance and convergence, is the key reason for choosing between technologies. We argue that it is more about interactivity. A lot of interactivity may be required in a simple task just because it needs

a common decision. On the other hand, some complex tasks are easier to communicate initially in a written form. Several interviewees mentioned situation where a complex topic is first communicated through a technology with low interactivity and after that through a technology with high interactivity to form a common understanding. Even though this implies that both conveyance and convergence are needed, it does not mean that interactive channels dominate the less interactive ones. In the interviews and questionnaires, it also became evident that there is large difference between the amounts of interactivity different technologies have. This parallels the thoughts of (Dennis, Fuller & Valacich 2008); that most communications are a mixture of conveyance and convergence.

Communication velocity was also seen as a technology capability affecting the choice of what communication technology is chosen. The individuals had made an assumption on how fast a specific technology is reaching the recipient. Technical properties and assumptions of the velocity of communication occurring with a given technology had an effect on how individuals chose their communication technology. The communication velocity seemed to be closely related to the individual factors affecting the choice.

Documentation, which was closely related to the rehearsability and reprocessability as mentioned by (Dennis, Fuller & Valacich 2008), also played an important role when individuals chose a technology. In some situations, the interviewees clearly wanted to have a document on what sort of communication had occurred and what it had included. It was also mentioned that some communication is best sent in a written form. This supports that rehearsabality and reprocessability are capabilities that are considered when sending and receiving messages.

5.2.3 Individual Factors

This study identifies two important individual factors that had an effect on what technology was chosen as a mean of communicating. As (Carlson, Zmud 1999) noticed in his research, experience has a substantial role on how users decide to communicate.

We found out that the experience of both technology and the partner for communicating had an impact on what technology was chosen. The other factor affecting the choice was the situational factor that the communication occurred in as. As (Watson-Manheim, Bélanger 2007) argue, these are the factors that affect a specific communication and how the individual perceives the situation where he/she is communicating in.

The most important factor was the target audience and the experience with how to communicate with a specific person or a group. All of the interviewees mentioned that the target audience affects the choice of media. In some cases, the comments were simply that "I know that he/she does not use that media so I will use this one", while in some cases it included a comment such as "I cannot use that channel for external communication". On the other hand, five of the 69 (7,2%) respondents to the open questions in the first questionnaire referred as the experience being the most important criteria for choosing a channel. It can be concluded that in most cases communicators do reflect their past experience of channels used previously, and according to their experience choose what type on communicating is suitable for different target audience and communication purpose.

In addition to experience, two situational factors affect how and what technology was chosen for communicating. The factors that came up in both questionnaires and interviews were urgency and location. It should be noted that urgency occurs between the individual and communication environment, whereas the previously mentioned velocity of communication is a capability of the technology that might be used because of the urgency. Urgency was clearly a factor that affects what channel was chosen. 5/9 individuals in the first interviews mentioned urgency being an important factors when considering what technology to use. In the questionnaire, this was also in some cases referred to as the most important reason to choose a technology for communicating.

The other situational factor, location, was a more contradictional indicator for choosing a technology. In the questionnaires, it was referred a few times as the most important factor, but in the survey it was only mentioned in a few cases. Instead, all of the interviewees mentioned that they use basically the same tools when working at home

compared to being at the office. The importance of location was only stressed as an important reason behind the choice of communication technology, when there simply was no option for a face-to-face meeting. In a situation like this, the location of members inevitably had an effect on the chosen technology. Also, differences might be due to the different roles inside the BUS unit of the target company. For sales persons that actively meet customer in various locations, location has a completely different meaning than for a back-office employee whose work locations mainly compose of either office of home.

5.2.4 Communicating Tasks

The problem of defining a category of tasks that is comprehensive and suits the approach of this thesis was a challenging decision. As mentioned in the beginning, it is very different to study an environment where an individual with himself interacts with an IS to and an environment where social interaction comes a key factor. Studying a unit where most of the work is up to some degree knowledge work produces some difficulties. Knowledge work involves various different kinds of tasks, such as collecting, disseminating and sharing information. The work is often non-routine with large amounts of task variety and uncertainty, and with tasks that are often complex and involve ambiguous outputs (Bélanger, Allport 2008).

This ambiguity and complex nature of everyday work, combined with the increasing need of communication on the issues related to everyday work, create an environment where it is very hard to define a specific group of tasks. Therefore, we use task not as the ultimate assignment that should have a fit to a specific technology. Instead, similarly to McGrath, we see tasks as a social setting that uses a set of technologies to complete a project. We take McGrath's TIP theory to examine tasks as a sequence of activities that are required to complete a specific project (McGrath 1984). We analyze what modes and technologies in the previous analysis are used for which purposes in our target company.

5.2.5 Tasks, Technology and Individual Factors

To understand the holistic picture of how communication technologies form a fit between different tasks, we have to start building the picture from the task. In the viewpoint of this thesis, most of the communication happening in the target company, can be places in one of the four modes described by McGrath's TIP theory. Therefore, we start by analyzing how these technologies or individual factors differ in different task modes.

The mode and function described by TIP provides the starting point for activity that happens inside the organization. Even though it is challenging to build up a general framework on what technology should be used for a specific mode, some indications were found on how communication happens in different modes. How much and what communication technologies are used in a specific mode tends to differ.

In the inception phase, there is generally less interactivity required, and therefore technologies that pose less characteristic of interactivity are used. Information can often be shared through a channel with low interactivity so the receiver has sufficiently time to understand the provided information. This is supported by the fact that when information sharing and coordination is the goal of communicating, lower channels of interactivity are preferred. According to the interviews, 6/9 preferred email or workrooms for sharing information. The questionnaire also indicated that the respondents saw sharing information as an important reason to communicate. According to the questionnaire results, most of the respondents somewhat agreed that information sharing is the most important form of communication having an average of 3,97 on the five step liker scale.

The same applies to coordination; one of the key reasons why coordination was needed in the inception phase was appointing the essential responsibilities of the project to specific individuals. The questionnaire results indicated that the biggest share of communication an individual initiates has to do with coordination issues. The respondent somewhat agreed that most of their communication is coordination. On a likert 1-5 scale the average was 4,17. We argue that much of this coordination was

done on a low interactive media so that some documentation was available for later inspection on how a specific issue had been agreed on.

Despite this, we agree with (Dennis, Fuller & Valacich 2008) that the more novel and complex the project inception, the more interactive channel is needed. This does not mean that there is less use of low interactive media, but it means that more interactive technology is included in the mode. 7/9 of the interviewees mentioned that a combination of providing written material could be complemented by some sort of a meeting. We argue that the reason behind this might be that in basic cases, there is mainly a production function in this mode, but in a more complex situation it requires also well-being and member support function that initially use more interactive technologies than the product function. Therefore, more complex and ambiguous project, inception has a larger proportion of communication that happens through high interactive media.

In a novel case, basic coordination can be done in low interactive technology and in a written form, whereas in a more complex case some sort of meetings has to be held to understand what is to be coordinated. Also one of the interviewees mentioned that meetings are essential so that a basic amount of trust is created between the members completing the project (Interview 6). We suggest that for a more complex project, more trust is needed. Therefore, this supports the idea that complex tasks need more of well-being and member support functions. In some situations, video or teleconferences can be sufficient to create the trust, but in some situations face-to-face meetings might be needed.

Even though the fastest route from the project initiation to the completion would be a straight route from inception to execution, in most cases there are at least some problems to be solved before the final execution. 5/9 of the interviewees stated that problem solving needs some degree of interactivity, but it was also stated that in reality much problem solving is done through email. If the problem is novel and more production function focused, problems are still solved on lower interactive channels. But, on the other hand, if the problem is more complex it is very easy to move straight

up to picking up a phone and calling or holding a meeting. Compared to initiation phase, there exists a greater potential for misunderstandings and useless exchange, so it becomes increasingly more efficient to use interactive channels. In most cases, the employees tend to also have the basic knowledge of the issues at hand and less written communication before a meeting is required.

When completing a project with other people in an organizational environment, there also tend to be conflicts on how the project should ultimately be executed. To ensure that communication can concentrate on the tasks at hand, conflicts have to be resolved. In the target company, conflict resolution seemed to have two issues that were brought up by the interviewees. First of all, conflict resolution implies negatively toned communication and it was stated that negative issues should only be communicated face-to-face. As a second issue, closely related to conflicts, was that face-to-face communication often related to relationship issues. These two were seen as issues where meetings are essential. 6/9 of the interviews agreed that relational issues should be done face-to-face. One of the interviewees mentioned that in this sort of situation a meeting should be arranged and the conflicting issues should be raised on the table. Because the stress on this mode is on well-being and member support functions, written documents have a limited use. Therefore, we argue that this mode is the one where most interactivity is required. However, it should be noted that the results of the questionnaire indicated that the least amount of communication conducted related to conflict resolution.

In the last mode, we move again towards a production focus. When the project at hand reaches this mode, there should be a clear picture on what is to be done. Therefore, each participant performs the tasks assigned and the communication is more about confirming small issues than building the large picture. As two of the nine interviewees mentioned; "if decision is made by me, little interaction is needed". On the other hand, it was mentioned that "if I need confirmation from other people, more interactivity is required". We argue that less interactive decisions can be made when the roles and ways of executing the project are well divided. Of course, not all decisions can be made alone, and therefore, some interactive ways of communicating are needed to confirm

the right procedures. As in execution and problems solving, some differences exists depending on whether the decision is novel or complex. A more complex decision evidently needs a more collective agreement where more interactivity is needed.

The situational factors presented previously affect every mode. They seemed to be those factors that override the rational decision between the task and technology. From the situational factors, urgency seems to be the most important individual factor. The amount of urgency imposed on the communication affects the choice of the technology used. The amount of time available to resolve a problem might guide the decision to use a specific technology. This might be the real life trade-off situation where urgency might affect the chosen technology. Several of the interviewees mentioned that if the matter at hand is urgent and that they do not receive an answer on a specific communication technology, they switch to the replacing technology to complete the task. Email was mentioned as a good example. If an urgent email is not answered, it seemed to be easy to switch for a phone call or SMS. Anyhow, it must also be noted that this urgency can lead to a situation where any means that are seen as a possible way of communication can be used. One of the interviewees stated that being in a hurry, can actual result in not thinking at all about what technology should be used

Leaning on these results, it could be argued that urgency has an effect on the modes that are visited when going through the TIP process. The two less interactive modes of inception and execution can be substituted easily with another available communication technology, if the task is urgent enough. In some cases, even problem solving was said to be done through email. Even though most of the interviewees agreed that a more interactive technology would have preferred. The conflict resolution mode is probably less affected by the urgency. Conflicts tend to block the advancement of a project, and they need high interactive communication to be solved. It can therefore be argued that in some situation urgency can move the communication to a less interactive technology.

As claimed by (Carlson, Zmud 1999), the experiences, especially with the counter partners of communication have an effect on the choice of communication technology. As a single one to one communication this can affect any two or more members that are

communicating on any of the modes introduced above. We did not find evidence that experience would be particularly important in any of the modes. All the interviews saw it as an important factor, but modes that where particularly prone for being mediated by experience were not identified. On the contrary, it can therefore be argued that the experience affects all modes.

Location as a factor seemed also to be pretty straightforward and it could not actually be traced to any specific modes. It was simply the issue that divided face-to-face meetings between those technologies that were able to replace face-to-face meetings. Of course, the increasing quality of communication technologies has enabled more options to replace the face-to-face meetings when they are not possible. Therefore, location, similarly to urgency, becomes a trade-off between the importance of the issue being communicated and the needed amount of interactivity. As with experience and urgency, location can be a mediator in choosing the right communication for a specific task mode and the technology needed for an efficient communication in that mode.

Figure 14: Adapted TTPC
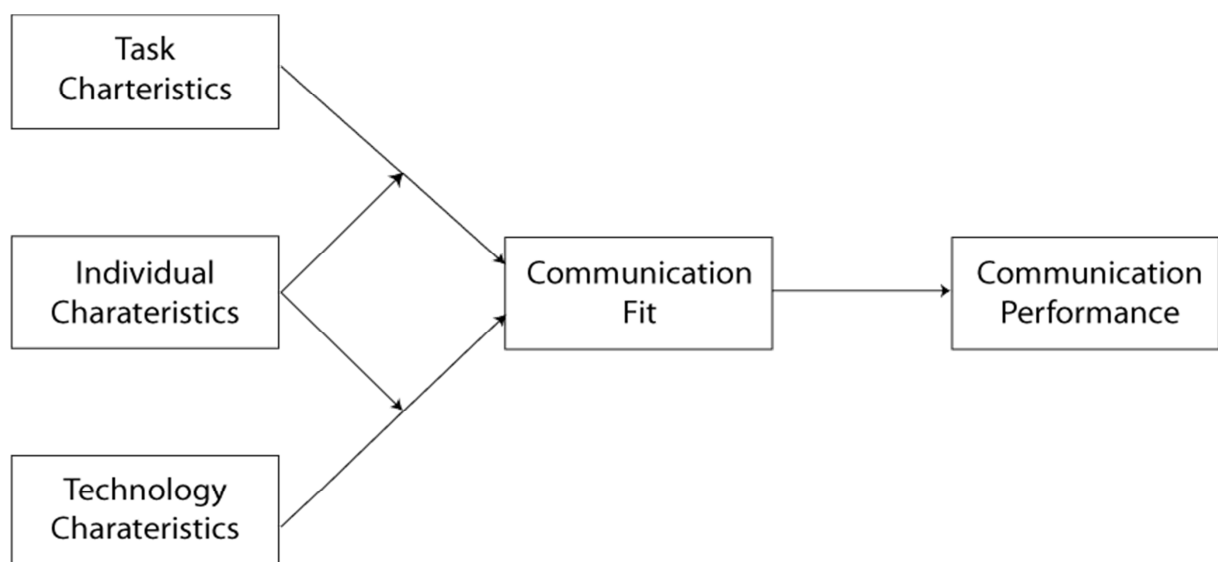
Source: Adapted from (Goodhue, Thompson 1995)

The most important findings of this chapter are that the employees in the target company are relatively well aware of what communication technologies they use and what are the main advantages and disadvantages of each technology. It is somewhat

clear what communication technologies are good for a specific type of communication. They do understand when high amount of interactivity is needed and when a written message is the best solution. They also seemed to be aware of their communication partners, and up to some degree, they also thought about what channel to use with a given partner or group.

The biggest challenges exist when situational factors become a critical factor for the completion of a task; it is no longer about the best technology for communication, but rather what is the easiest way is for the communicator. Therefore, as the figure presents, in our opinion the initial assumption for communication fit come from the fit between task and technology, but before the communication they are mediated by the individual factors. We argue that this does not fully explain why people seem to think that communication is not always efficient, and therefore, we must take an organizational view of the issue in order to analyze how this affects the communication of the employees in our target company.

5.3 Organizational Structures

As presented in (Goodhue, Thompson 1995) TTPC, also organizational factors have an impact on the communication process. Contrary to the view of (Goodhue, Thompson 1995) we take the approach of (DeSanctis, Poole 1994) where the organizational effect is seen as being a dual process. Instead of just having impact on how a single communication turns out, we see the organization being able to affect the process before, during and after the single communication process. In our interviews and questionnaire we aimed to examine if a collective culture of communication exits in our target company and how this is apparent.

According to DeSanctis and Poole, advanced information technologies differ from the more traditional computer systems. They argue that whereas the more traditional systems offers only support for completing business transactions, more advanced systems provided possibilities of coordinating tasks and the ability of information

exchange. Following this assessment we can safely conclude that communication technologies are seen as being advanced information systems. (DeSanctis, Poole 1994)

The rest of this chapter will examine how the individuals working in the company identify the possible norms and ways of working that guide their communication and if these affect the communication fit described in the previous section. We also examine does a coherent communication culture exist. We aim to identify are there communication structures in place to guide the communication processes inside the company. We also examine the role of training introduced by (DeSanctis, Poole 1994, Wheeler, Valacich 1996). Has training been used to support the technology and socially related structures that are identified?

5.3.1 Cultural impact

The previous section analyzed the potential communication related technology structures that were in place in our target organization. As stated by DeSanctis and Poole, the technology structures are only part of the factors affecting how a specific technology is used (DeSanctis, Poole 1994). Along with the technology structures, there also exists a social structure. Therefore we also aim to examine the possible social structures that support the use of the available communication technologies. The overall communication culture of the organization and the possible smaller subcultures are those that can strongly guide how the communication technologies are used in action.

On the highest level we examined if there exists a common organizational wide culture. A very clear result was that the employees cannot identify a culture that would be common to the whole organization. 8/9 of the interviewees could not identify any type of culture that could be said to be common for everybody. 6 of these stated that no culture exists and two identified some type of an emergent culture that is hard to put in to words. The questionnaire indicated similar conclusions. The respondents somewhat disagreed with a statement that the organization has a common communication culture. On a likert one to five scale the average was 2.63.

In our interviews we also had a question on what the employees perceive to be the maximum accepted reply time to a received email. It could be argued that if some guidelines do exist for this there should be a common answer. Most of the interviewees mentioned that during the same day and at latest on the next morning. But also in this case there were differences. One of the interviewees said he expects and answer within two hours and mostly does receive the answer in this time. On the other hand one was satisfied if he/she receives the answer within two days. Even though the differences are not that big, one could argue that this suggests varying ways of communicating with email.

The interviewees mentioned three possible reasons why there exists no common culture in the organization. Firstly it was said that the subunits of the company are very independent and they communication somewhat differently. Secondly, and probably more importantly, 4/9 of the interviewees felt that they have no idea whether the organization has a clearly stated strategy on how communication should occur. One of the interviewees felt that training and agreeing on common practices within teams is useless if there does not exist guidelines that are made common for the whole organization. This was also reflected in the third reason. According to the questionnaire the respondents could not clearly identify receiving instructions on how communication technologies should be used. The employees felt that training on communication practices would be more important than pure technical training.

The employees were also questioned about the communication culture existing in teams. Mainly the results indicated the same trend of not having a common culture and agreed practices, but some of the interviewees mentioned that issues concerning communication had been brought up and discussed. Two of the nine interviewees mentioned that their team had agreed on some common guidelines. We argue that this was the result of some teams having more interaction and leadership than others. In most cases the teams tended to have formal meetings once in a week were the people were updated with possible changes. But in these two cases the teams worked more together and this supported the reason behind discussing communication practices. One of the interviewees also identified a common practice in their team. She told that if

somebody had a good idea on how communication should occur she/he informed this though email and later on posted it to their team's workroom.

One interesting point that emerged from the interviews was the role of a project leader on communication. While in most cases the communication technologies that where available in the hierarchical teams were also available in the project teams. 4/9 of the interviewees indicated that how the project team will communicate is the responsibility of the project leader. During the project initiation she/he should therefore build up clear guidelines of how the team should communicate and discuss what type of communication happens with a specific communication tool. We suggest that providing guidelines for organization wide communication and building up communication practices could be done by unifying how project leaders defined the communication rules for a specific project

5.3.2 Training

To examine how an organization can actively intervene on how individuals use communication technologies and build of new social structures we take the concept of training under examination. As DeSanctis states, how people use the structures is dependent on their knowledge and experience on using the structures (DeSanctis, Poole 1994). Training is seen as a very important way of providing individuals with sufficient knowledge and experience. We highlight the importance of training with communication and the technologies associated with it. Therefore we aim to examine does our target organization provide training and how do the individuals feel about it.

In addition to training providing the individuals with sufficient skills to communicate with the available technologies, it also plays an important role in build up the structures on how technologies are used. As noted by DeSanctis and Poole, structures a build upon everyday use of technologies (DeSanctis, Poole 1994). We argue that training has a strong impact on what technologies are actually used and how they are used in practice. When coordinated, training can be used to guide employees towards using specific technologies.

The results from the interviews indicated that the employees didn't receive training on a regular basis. Only one of the nine interviewees recalled when and what type of training she/he had received. People seemed to understand that training would be required, specifically on the practices on how communication technologies should be used, but on the other hand they felt that they don't have time to attend training sessions. There also seemed to be some negative attitudes towards training since some of the previous training had been seen being useless.

Overall the training can be used to affect what the skill levels and usage of specific technologies. We argue that the culture and training have a cause and effect relation. Lacking training on how to use communication technologies causes people to have an incoherent way of choosing and using technologies. On the other lacking a companywide communication culture is realized with the lack of training for new and existing communication technologies.

The key finding of this chapter was the duality of structure suggested by Desanctis and Poole was not very evident in the target company (DeSanctis, Poole 1994). The communication culture was more of an emergent type. It was formed by using the communication technologies first, and through the use ways to appropriate the technology was formed. This makes it very hard to build up a culture where communication technologies would be used in a unified way and that the possible productivity gains would be fully realized.

6. Findings

The available technologies used in the company seemed to include the most common ways of communicating in today's business environment. It can be argued that the use of the technologies leaned heavily on a few communication technologies. In both surveys and questionnaires, the most used communication methods were email, phone, Intranet, and SMS. All of these technologies have been used for more than a decade.

These were also complemented with face-to-face and informal meetings. The conducted research provides some possible reasons for this. First of all, the average age of the employees, in both surveys, was closer to fifty than forty. Most of the employees had also worked for the company for more than 8 years. Therefore it might be the case that during the recent years, the mix of communication technologies has been relatively constant. Also it was evident that there is no clearly communicated communication culture that could be used to change the communication patterns.

Most of the results indicate that concentrating to a few technologies is not because people would not be willing to try new technologies. Neither is it because employees would not understand the benefits of certain technologies. Most of the people were in fact open to try new communication technologies. The analysis of the used technologies clearly indicates that the users have a clear picture on what are the pros and cons of a specific communication technology. Therefore we argue that to change and increase the productivity in organizational communication, the focus should not be on technology itself, but on the other factors that were found to affect the organization wide communication. Based on research, defining a clear communication strategy would need managing all three aspect described in the previous section; communication technology, individual and organizational communication culture. The findings indicate that mainly the third aspect, culture and training, was unclear.

It was also evident that people do think about the receiver of the message and the experience of both the communication channel and the issue being communicated. This then affects the communication process and choice of technology. The question remains: do people think about the communication they are conducting just to ease their own effort or actually to communicate efficiently? Considering productivity, this plays a huge role. To increase the productivity of communicating, the issue should be addressed through a larger picture and a longer time period.

In addition to the experience, other situational factors such as place and urgency of the issue at hand were also found to affect the chosen communication technology. From the productivity view, these are a problematic issue. They are very much linked to how the

individual responds to a unique situation. Therefore it is very hard to directly impact these situations. Only indirectly through the organizational structures can the organization provide the individual with norms and instructions how specific communication situations could be handled.

The surveys and questionnaires also indicate that McGrath's TIP provides a tool for analyzing tasks and how they fit specific type of communicating. It can be concluded that the employees somewhat well understand what type of technology fits a specific task. We argue that communication technologies are relatively simple technologies and the users use them on a continuous basis. Therefore the fit between them is clear in many cases. Anyhow, individual and especially the situational factors can steer the user towards a direction that forms a misfit between the task and the technology. In our opinion, this provides a challenge for effective communication, but if master it can enhance company's productivity. We argue that through the organizational structures, companies can change how employees perform in different situations and how their communication can form a better fit between the used technology and task.

One of the biggest findings was that neither in the survey nor in the questionnaire was a common communication culture. As argued, culture can have a huge impact in guiding how people communicate. This is especially highlighted in a unique situation where no previously defined communication patterns exist. These were also identified as the situations where most of the misfits between task and technology occur. Culture has a significant role in enforcing existing communication patters, but it can also be used to bring in new ways of communicating. Therefore we argue that to enable efficient communication there should be a coordinated way of communicating in the company. Training can play a key role in achieving this.

Findings on a more practical level showed that some teams had a common project communication culture. However, this seemed to be very dependent on a project leader. It was stated that some project leaders made it clear from the beginning how communication should be handled. We see that creating guidelines from the start would form a sound basis on creating a team communication culture. Providing these leaders

with coherent guidelines on how to communicate could provide a useful way create a communication culture. If this was done on an organization widely, it could provide an environment where a unified communication culture could be formed.

7. Conclusions

It is important to understand that communication technologies differ from the more traditional IT technologies. Even though a single user might master the use of the technologies and understand the best circumstances to use it, this is not enough to communication efficiently throughout the organization. To seek how productivity can be improved with the use of communication technologies one has to apply a holistic view to unify the whole organizations communication process.

Today's users have a fairly good understanding of the capabilities and possibilities that technologies offer to enhance their work. The question remains are these used up to the potentials they offer. Most of the challenges that organizations face are due incoherently applying technology upgrades. If the tools used and how these are used in practice, vary throughout the organization, productivity gains are hampered. To actually realize these gains, organization must invest in training at build up an organizational communication culture.

The time factor is of essence as well. Updating or getting rid of old practices and communication manners is likely to take time; typically it is harder for employees that are older and have worked in the organization for a long time. It is also problematic that today's organizations and employees are overloaded with e-mail traffic and many workers have difficulties with organizing and control her/his e-mails. E-mail is also used for such purposes for which it is not the most identical tool, for instance, in group communication and archiving.

It is essential to realize that when taking a new technology into use in an organization, systematic planning and persistency is required. It is incorrect to assume that employees can adopt a new communication tool without proper guidance from an employer. The employer should create a framework explaining, for instance, how and in which situations and with whom certain communication tools should be used. Guidelines and organization and team level training can provide as a useful way of communicating this framework down to the employees that actually work with the tools.

A new communication tool cannot change communication practices unless an organization brings its communication culture up to date and is willing to support employees with the adaption of the tool. The support should be available, for example, in the forms of training and IT help desk. Also, the communication manners of co-workers and own team are impacting a lot on individual worker's use of different communication tools.

In overall, it can be concluded that communication technologies' effect on individual worker's productivity is limited in many ways. In the worst case, employee may not even be aware of a communication tool that is available in the organization and that could improve her/his productivity. In the target company, communication tends often to be inefficient as relevant information is not available when needed. To increase productivity, the employer should have up-to-date internal communication guidelines and organize trainings and other support for employees, particularly when new communication tools are taken into use. Sharing and archiving relevant information and documents so that they are available for co-employees should be a common practice. Also, the management should act as a role model and encourage employees to adopt new communication tools and follow communication guidelines, if those exist in the organization.

Appendix 1: Interview questions

1. **General question of the employees workday**

   - What's your role in the company?
   - Could you shortly describe your everyday job?
   - Do you interact with the customer on a daily basis?
   - Describe your physical working environment.
   - How long have you worked for the company?
   - Has your job changed inside the company?
   - Briefly describe your IT experience.

2. **Communication technologies and their capabilities**

   - What are the communication tools used at TS?
     - Which do you use the most?
     - Would you need additional communication tools?
   - What are the capabilities of these tools?
     - The ones you use the most?
     - What's your background on these tools?
   - Describe what tools have the following capabilities?
     - Interactivity and possibility get a fast response.
     - Possibility to reach a large audience.
     - Possibility to use visual elements.
     - Possibility to check that the message has been understood.
     - Documentability.
   - Do these communication tools enhance your daily work?
   - How do you feel about new communication tools?

3. **Choosing what communication tool to use**

   - Describe how you choose what communication tool to use.
   - Does your task affect the choice of technology?
   - What technology is best for:
     - Sharing information
     - Making decisions
     - Creating relationships
     - Creating knowledge and coordinating
   - Can you describe any other factors that affect your choice of technology?
   - Do you generally continue with the same communication channel that the original message was sent with?
   - What unofficial channels do you use?
   - Do you often combine different communication channels when you communicate?

4. **Training for the used communication tools**

   - Have you received technical or non-technical training for communication technologies?

- What type of training would you require?
- Have individually sought knowledge on how to use a specific technology?
- Have you coworkers advised you on how to use a specific technology?

5. Communication practices in the target company

- Describe your team's internal communication with a few words.
  - What type of teams are you a part of?
  - How long have these teams worked together?
  - Briefly describe your teams communication practices?
  - How is knowledge transferred inside those teams?
  - What types of issues are being communicated?
  - For what reasons are meetings commonly arranged for?
- Describe a few words of organization wide communication.
  - What is the expected time to answer a received email?
  - What is the most common tool used for communicating?
  - Is email used for appropriate messages?
  - Do you receive a lot of junkmail?
  - Could some of the email you received be moved to other channels?
  - How do you acquire information when you need it?
  - Do you gather information that is not available through official channels?

6. How communication impacts your average workday?

- Do you have enough time to complete your daily work?
- Do you have time to familiarize yourself with work related data flow?
- How does the data flow impact your work?
- Are interruptions typical for your workday and do they disturb you?
- Could these interruptions be lessened?
- How long is your average workday and does in continue when you get home?
- How is your workday divided between? (Meetings, reading email, on the phone etc.)
- How do you prioritize what work you execute first?
- When are you most productive? Do communication tools increase your productivity?
- What could make your work easier?
- What is most challenging in your work?
- Are you ready to continue the next 10 years with the same workload?

7. Expectation of Microsoft Office Communicator before use

- What do you expect of OC, will it impact your work?
  - Will help you execute work faster?
  - Will it improve your productivity?
  - Will it make your work easier?
  - Will it affect your works quality?
  - Can you gain a better control over your work?
  - Do you expect the tool to be flexible and customizable for yourself?
- Do you believe that using the tool will be easy?

- - o Is it normally easy to learn the use of new technologies and will use OC be easy?
  - o How easily you remember what you have learnt about using the technology?
  - o Will using OC be effortless?
  - o How you deal with problems related to technology tools?
  - o Is it important that technologies recover quickly from possible errors?
- Will all of the above affect you willingness to learn the use of new technologies?
- Can these expectations changed?
  - o With training, support, motivating or role models?

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