Managing Attention Budgets in a Project-Based Organisation

- A Project Communication Framework -

Frida Börjesson & Jens Nilsson
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Abstract

Background: The knowledge-based theory proposes that knowledge and how it is managed is an important factor for determining the competitiveness of corporations. Project-based organisations are often put forward as a fast and flexible way of managing knowledge. The prioritizing between different tasks and projects in such organisations is to a large extent done by the individuals. In addition, electronic communication technology enables large amounts of information to travel far and fast. The bounded rationality of the human brain, the flood of information and the multitude of tasks pose a big challenge for project-based organisations. Communication is crucial for efficient project work and given this background it is interesting to examine how individuals in project-based organisations use different communication channels.

Purpose: The purpose of this study is to explore individual communication behaviour in a project-based organisation and from these understandings create a practical framework for discussing and actively managing project communication.

Research method: The gathering of empirical data was done through a case study of the Converting Standard Line Project – TBA at Tetra Pak Carton Ambient in Lund. The case study consisted of observations and 20 qualitative interviews conducted with the project members, the project manager and representatives from senior management.

Results: The choice of communication channel was governed by the relative relation between individual gain and individual attention cost and high social presence media such as face-to-face interaction were more preferred than suggested by existing theories. Moreover e-mail had characteristics that made it more than a communication channel and therefore more popular than suggested by existing theories. Finally the study proposes a project communication framework that can be used as a platform for active management of project communication and thereby enabling a more efficient use of the limited attention budget of each individual.

Key words: Attention Budget, Communication Framework, Media Choice, Project-based organisation, Project Communication
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We will always remember the spring of 2006 as one of the most intriguing and exciting periods of our education. The luxury of independently exploring new knowledge has been an delight so rewarding that it is with mixed feelings we now face the completion of this study and thereby our education. A main contributor for making this spring such an mind extending exercise is Professor Lars Lindkvist at LiU School of Management, who through his encouraging but challenging guidance constantly made us push our arguments one step further. We thank you for this and for having trust in us even when it seemed like time was about to run out. We made it.

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Linköping,
30th May 2006

Frida Börjesson & Jens Nilsson
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I INTRODUCTION

In this chapter we will present the background for the study, followed by a problem discussion where areas of interest are discussed, highlighted and formulated into research questions and the purpose of the study. Finally the disposition of the thesis is presented.

Background

“To make knowledge-work productive will be the great management task of this century, just as to make manual work productive was the great management task of the last century”

(Peter Drucker, 1969, in The Economist, 2006:12)

This quote was stated more than 30 years ago and refers to the 20th century. We have now entered the 21st century and a lot of effort and research have been dedicated to the field of knowledge management. However, there is much left to unfold on how knowledge can be understood and leveraged. This is illustrated by the fact that in February 2006, The Economist spent a whole special issue on the very topic “Knowledge and the Company”. The search for new ways to organise knowledge is constantly ongoing, a common point of departure is however often the project-based organisation, as noted for example by Sydow et al (2004):

“Recent interest in the emerging knowledge economy has reinforced the view that project organizations in their many varieties are a fast and flexible mode of organizing knowledge resources”

(Sydow et al, 2004:1475)

An acknowledgement of knowledge as a key asset is recognized in the knowledge-based theory of the firm proposed by Grant (1996). Knowledge is a complex and intangible concept that can not be measured and managed as easy as pure manufacturing production (Fahey and Prusak, 1998). Knowledge can be individual or collective (Grant, 1996; Brown and Duguid, 1998) and easy to articulate or embedded in practice (Brown

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1 A weekly magazine on politics, business and economics published by Financial Times.
and Duguid 1998; Tell and Söderlund 2001). In the vast array of knowledge management literature there are many attempts to simplify the managing and transfer of knowledge by proposing extensive information processing management systems\(^2\) as the solution. (Fahey and Prusak, 1998) Some of these are even questioning if the firm is needed anymore now when new technology is available, but many voices has though been raised against this view. (Brown and Duguid, 1998; Fahey and Prusak, 1998; Grandori, 2001; Sapsed et al, 2005) Fahey and Prusak (1998) points out that such proposals do not consider the difference between data, information and knowledge and are therefore not sufficient for explaining the process of knowledge management. The danger of overestimating the abilities of information transmission held by new technologies and confusing it with knowledge transfer is stressed by Sapsed et al (2005). An alternative to the strong reliance on technology as a tool for managing knowledge is the group based view stressing that the best way to transfer and manage knowledge is to create communities where members work side by side for example held by Brown and Duguid (1998). Notably, there is a difference in opinions on how much information technology can help in managing knowledge.

This discussion is not only limited to the knowledge area. Organisations of today are faced with the dilemma of balancing structural responsibilities and individual responsibilities on a larger scale. The increased global competitiveness and speed of change calls for dynamic and adaptive organisations who can integrate knowledge specialists sourced from all over the world. (The Economist, 2006) The demand for flexibility together with an increased need to integrate specialised knowledge has made the project organisation more and more common during the 1990s and can today be viewed as the dominant organisation form (Söderlund and Bredin, 2005). The project as a mean to organise work can be seen as a fast and flexible way of organising knowledge (Sydow et al 2004). However, the project-based organisation can be problematic due to unclear division of roles and responsibilities. Moreover, there is often a struggle of resources between the function and the project. This combined with the fact that it is common for project members to participate in more than one project at a time poses big challenges for the individual project member to plan, coordinate and prioritise among the different projects and tasks. (Söderlund and Bredin, 2005)

\(^2\) Here information processing management system refers to the technical system and do not include the people in the system.
At the same time as the organisations are becoming more project-based the new
electronic communication technology is developing fast and technology such as e-mail,
intranets, video conferences and internet home pages enables enormous amounts of data
and information to travel globally in virtually no time (Fahey and Prusak, 1998). This
has led to the expression “Information overload”, a phenomena that has been discussed
in both academic articles and management magazines for several years (see for example
Eppler and Mengis, 2004; Scofidio, 2006; Grates 2005). In management magazines
there is a general discussion about how to cope with the enormous amount of e-mail that
are flooding the inboxes and what strategy should be used in order to tame the river of
information (Grates, 2005; Scofidio, 2006). The academic literature is proposing
different definitions depending on perspective but a common everyday interpretation of
the term is simply “receiving too much information” (Eppler and Mengis, 2004:326).
This is addressed differently by different researchers, one way is to see it as objective
measures as time available versus time needed to process the information, “if
information requirements > information processing capacities”, (Eppler and Mengis,
2004:326) where the requirements and capacities are measured in time available, the
result is information overload. Another perspective is taking departure from more
subjective measures based on individual feelings of being stressed, overloaded and that
they can not cope. (Eppler and Mengis, 2004)

This change in organisations poses a new and more complex reality for the individual
members in such organisations. A knowledgeable project worker is on a constant move
between different contexts, projects and parts of the world constantly online with a
laptop and mobile phone. The amount of communication needed in order to manage and
coordinate a constant motion of both body and mind has risen. E-mails are flooding the
inboxes and meetings, both physical and virtual, takes up a large part of the time.
(Economist, 2006)

“It also matters how you talk. Face-to-face or over the phone? By voicemail or by
texting? The rapid development of telecommunications has opened up all sorts of
new options, yet little research has been done into the relative effectiveness of new
ways of communicating.”

(The Economist, 2006:16)
Problem Discussion

How then, should people in project-based organisations communicate with each other? Based on the assumption that how communication is conducted and which channel to use does matter, this is an interesting question. How can communication behaviour in project-based organisations be understood? Which factors have an impact on what channels they use and how do individuals use different channels? Under what premises do individuals in project-based organisations choose what channel to use, now when the number of channels available is constantly increasing? Do they choose?

As noted in the background the daily life of many workers in project-based organisations implies prioritizing between many different tasks and projects while simultaneously processing large amounts of information. Information is transferred between people through communication, why communication is crucial for today’s organisations. However communication is often viewed as a somewhat fluffy and intangible concept which can be used to explain everything and therefore arguably nothing. Project plans commonly states that a key success factor is communication, however evaluations reoccurring states that the communication could have been better. Why is it so? We believe that the tacit nature of communication and its all embracing effect on all aspects of human life makes it both hard and unpleasant to handle.

Scholars have been concerned with the concept of communication and its meaning since the time of ancient Greece and this has resulted in a flora of different analytical approaches. Communication can therefore be analyzed and interpreted in more than 50 different ways, ranging from psychological to political approaches. (search.eb.com1) One more general definition of communication found in the Encyclopaedia Britannica Online is “the exchange of meanings between individuals through a common system of symbols” (search.eb.com1), another one found in the Cambridge Dictionaries Online is “the act of sharing information with others by speaking, writing, moving your body or using other signals” (dictionary.cambridge.org). We will hereafter use communication in the meaning presented by the Cambridge Dictionaries Online.

In the background presented earlier we saw that communication in corporations has undergone a change the last decades as new communication channels have become available, if we return to the definitions above we can see that the ways made available for exchanging meanings and/or the signals available have increased. From an
organisational perspective it is an interesting question how these new modes of communication affects information transfer and knowledge integration and thereby performance and coordination of the tasks demanded.

Since an organisation consists of people tied together we believe it is fruitful to consider how the human being works when constructing organisation- and communication structures. This is also stressed by Grant (1996) who puts forward that the human brain is a bearer of knowledge. It has been found that the human brain has the ability to process seven plus or minus two items at a time (Nörretranders, 1999), if there is more items of information the human brain starts to make simplifications by clustering them together. The brain does not care if it is useful information, as information for solving a problem or if it is gossip about what happened at the company’s Christmas party. The brain still just copes with seven plus minus two items.

The limited capacity of the brain is considered and translated into business literature by Simon who brought forward the concept of bounded rationality. (Simon, 1991) Given the amount of information that project workers are exposed to and the number of channels available, the bounded rationality of the human being must be taken into consideration when studying communication behaviour. In addition to this, projects often have a tight time schedule and many project members participates in other projects simultaneously (Söderlund and Bredin, 2005). These factors combined leads to a risk for information overload, both in an objective perspective where time needed is greater than time available, and in a subjective perspective where people feel stressed. (Eppler and Mengis, 2004).

The choice of communication channels based on the individual biological and psychological foundations has been explored by researchers (for example Kock, 2004; 2005; Robert and Dennis, 2005). However, we suspect that these theories have not fully incorporated the imperfections under which communication in project-based organisations is conducted. The circumstances in a project-based organisational setting are far from ideal in terms of the time available and the individuals split attention caused by their simultaneous participation in several projects. The balance between structural and individual responsibilities has always been of interest to both scholars of organisation science and practitioners. Even more so, given the complex reality of project members in today’s project-based organisations where responsibilities for
Managing everyday work have been handed over to the individuals in search for increased flexibility and adaptation. However, the bounded rationality, the shortage of time and the split attention of individuals makes this shift in responsibilities problematic. This leads us to a key question for management of today: which structures can be provided for supporting individuals and taking back some of the responsibilities without risking to lose flexibility?

Given the previous discussion about the importance of communication, the dismantling of hierarchies and the increased burden on the individuals who have a bounded rationality, a question can then be raised whether communication structures in the future can take a larger part in providing such a structure? By communication structure we here refer to the planned ways and support for communication provided by managers or other supporting functions. This support can consist of new technology as project management systems or more traditional ways as for example meeting structures and communication guidelines.

The new ways of communication have undoubtedly changed the reality of individuals in organisations of today, but as discussed earlier the new technology is not in itself a solution. Brown and Duguid (1998) argues the importance of dialectical thinking concerning the use of communication technology: “...sometimes it is useful to think in terms of both/and rather than simply either/or” (Brown and Duguid, 1998:108). Since organisations consist of many individuals tied together, such structures need, in our opinion, to be derived from individuals’ needs and behaviours in order to reach its full potential. We believe that the theories referred to above, focusing on individual’s choice of communication channels, are steps in the right direction. However they may not fully incorporate the complexities encountered by project-based organisations where time is limited, the number of knowledge areas involved is numerous and the attention of the individuals is split. It is therefore of interest to study how individuals communicate and how they perceive the reality of working in a project-based organisation of today.

Research Questions
The problem discussion has led us to the following research questions:

- How do individuals use different communication channels in a project-based organisation and why do they use the ones they do?
• How can individuals’ use of communication channels be understood in the contextual setting of a project-based organisation and which practical implications can be derived from these understandings?

**Purpose**
The purpose of this study is to explore individual communication behaviour in a project-based organisation and from these understandings create a practical framework for discussing and actively managing project communication.

**Structure of Thesis**
In order to facilitate for the reader we will now explain the structure of the thesis that will guide us on the journey towards fulfilling our purpose. Three different blocks serves as the foundation for this structure; *Project-based organisations*, *Knowledge management* and *Individual communication behaviour*. This is done since we believe that in order to explore individual communication behaviour one must also understand the context and purpose of the communication. The context is in this case a project-based organisation, and we see the purpose of communication as the leveraging of knowledge into market focused solutions. The frame of reference and the empirical findings will start with the project-based organisation, move on to knowledge management and finally discuss the individual communication behaviour. In the analysis we will start from the other end and start with the individual communication behaviour, move on to knowledge and finally explore the project-based organisations in terms of what structure that should be held by the organisation and what should be left to the individuals. The outline of the thesis is illustrated in Figure 1 and is followed by a short description of the different parts of the thesis.
Each part of the thesis will now be briefly described.

I INTRODUCTION
In the first chapter the background to the thesis is presented and the problem is discussed. Further the purpose and the research questions are presented.

II METHODOLOGY
In this chapter the authors’ ontological and epistemic views upon the world is accounted for and thereby the scientific approach for the thesis. The research design and the practical procedures are presented and the chapter is concluded by a discussion of the chosen methodology.

III FRAME OF REFERENCE
The frame of reference constitutes of the theories that the authors consider helpful in increasing the understanding of the empirical findings. First the perspectives on projects and project-based organisations are presented, then selected theories from the knowledge management field is presented and discussed and finally we present perspectives on individual choice of communication channels. Each chapter is
concluded with summarizing thoughts where theories are related to each other and our own thoughts and reflections are added. The frame of reference will then be used as a tool when analysing the empirical findings.

IV EMPIRICAL FINDINGS
This chapter presents empirical data gathered during visits to Tetra Pak Carton Ambient in Lund. First the story of Tetra Pak is told, and then the case study object - the Converting Standard Line Project – TBA, is presented. Then empirical findings from interviews with the project members and observations from the project kick-off, meetings and the office area then follows.

V ANALYSIS
In the analysis the empirical findings is analysed using the theoretical framework. We start by exploring the individuals’ use of different communication channels and continue with a discussion on the daily project work. The findings from these two parts are then combined in the third part into a project communication framework.

VI CONCLUSIONS
The last chapter contains the conclusions drawn from the analysis which aims to answer the research questions and fulfil the purpose of the study. Finally questions that have arisen during the thesis process is presented and developed into suggestions to future research.
II METHODOLOGY

The aim of this chapter is to present our ontological as well as epistemological standpoints in order to give the reader an understanding of the basic scientific principles that form the foundation of this report. Furthermore, methodological approaches, their limitations and the practical procedures of how the study has been conducted will be presented and discussed. The purpose is to make sure that the transparency of this report enhances its credibility and makes it withstand the enquiries of probing minds.

Scientific Approach

Humanity is in constant search for knowledge and explanations that can bring meaning into, and understanding of, a complex reality. Since ancient times the views and methods for deriving valid conclusions of the world around us has been restlessly explored and wildly debated. The flora of theories aiming at decoding the world presented today is vast and interrelated why endeavours in this field is a time consuming and risky business, but nevertheless, or perhaps due to this, according to us the most intriguing one there is.

The basic perceptions about the nature of reality are usually referred to as ontology. (Delanty & Strydom, 2003; Arvidson & Rosengren, 2002) These individual assumptions are hard to proof or falsify why they are commonly treated as deeply embedded and individual truths wearing no label of right and wrong. Rather, they are to be viewed as expressions of each individual’s view of the world. (Arvidson & Rosengren, 2002) These perceptions together with an epistemological framework form the foundations on which research studies are conducted. Epistemology is defined as the theory of knowledge, bearing with it the rules and guidelines for how knowledge of the world can be derived. (Delanty & Strydom, 2003)

A broad and common division between these different views is done between the perception of knowledge as an absolute truth and knowledge as a relative truth. The former is derived from the natural sciences and holds the assumption that knowledge can be objectively attained and proved, positivism. The latter have sprung out of the social sciences and hold the basic assumption that since knowledge passes through a
subjective filter, knowledge can only be viewed as relative; this view is called anti-positivism and includes for example hermeneutics. (Quinn Patton, 2002) Depending on allegiances to either one of these views or an individual combination of both of them, the research undertaken may proceed in different manners why we feel that a presentation of our ontological and epistemological views is in its place, since these form the foundation of this research study.

Ontologically we believe that there are natural constants that preferably are measured and studied in a positivistic spirit; however, we do not believe positivism holds the possibility to fully comprehend the aspects of human behaviour. The tacit and unarticulated aspects of social interaction are in our view rather understood through heedful and intellectual interpretation of the world around us, why this study is based on anti-positivism. In search for a position where our anti-positivistic views can be expressed we have found our base of departure in the realist sociology perception, argued for example by Whittington (1988). Whittington puts simultaneous emphasis on both the pre-determinate elements of environmental structure and the possibilities for human agents to operate and move within these structures. Structures that Whittington argues present the “powers” (his emphasis) that both enables and limits the actions of human agents.

An explorative problem formulation is according to Jacobsen (2002) aiming at gathering nuanced data and details about a phenomenon in order to get an understanding of both the studied object and the context and according to Patel and Davidsson (2003) to create an holistic understanding of a problem area through gathering as much knowledge as possible. This is well in line with our problem formulation and purpose, our research approach is therefore of explorative qualitative nature, where we emphasise the importance of studying both the structures surrounding the individuals and the individuals’ action within these structures. The explorative problem formulation often demands a depth in the method according to (Jacobsen, 2002), the road towards fulfilling the purpose of this research study is thus in our opinion best pursued through a deep and thorough qualitative study. Our views and arguments for this can be summarised in this eloquent phrase by Albert Einstein:

“Not everything that can be counted counts, and not everything that counts can be counted”

(Albert Einstein in Quinn Patton, 2002:12)
Hermeneutics and Reflexivity

The methodological design chosen for this study can in many aspects be resembled with the basic hermeneutic circle, as presented in Alvesson and Sköldberg (2003). Hermeneutics sprung out of literature and theological studies and is based on interpretation (Quinn Patton 2002). Alvesson and Sköldberg (2003) presents two main approaches of hermeneutics, the alethic which focuses on the process between pre-understanding and understanding, and the objectivist which advocates the part and the whole as the relevant parts in the hermeneutic circle. Even though these two approaches are traditionally viewed as opposing, Alvesson and Sköldberg (2003) argue in favour of viewing the two approaches as complementary. Gummesson (2001) is presenting the same view when he illustrates the hermeneutic circle with the quotes: “no understanding without pre-understanding” and “an understanding of the parts assumes an understanding of the whole” (Gummesson, 2001:70) and further stress that the hermeneutic circle is rather to be viewed as a spiral. Given the ontological discussion in the previous section, where both the limitations and possibilities inherent in the structures are defined as “powers” surrounding the activities performed by voluntary human agents, we argue that whole in this sense can be referred to the project structure and part to the individual member of the project. Moreover there is a clear resemblance with how our process of gaining increased understanding follows a circular and constantly ongoing process between pre-understandings and understandings forming a spiral.

Even though we have recognized the hermeneutical approach as a mean to describe our process, it is not our intention to label ourselves as hermeneutics, but rather bringing to light the reflexive nature of our study, something that is illuminated by this quote:

“... we claim that the decisive quality in qualitative research is not the way its different components are managed. Rather, what primarily determines its value is the awareness of the various interpretive dimensions at several different levels, and the ability to handle these reflexively. Good qualitative research is not a technical project; it is an intellectual one.”

(Alvesson & Sköldberg, 2000:288)

The importance of reflexivity is also emphasized of Quinn Patton (2002), May (1993) and since the hermeneutic circle helps us to be aware of different interpretative levels
we see it as a helpful tool to raise our awareness and heighten the intellectual standards of our research process.

In order to make it clear to the reader the experimental and “looping” (own emphasis) characteristics that serves as the basic methodological foundation for this study, and how this has affected the practical procedures in this study, we have illustrated this in our own hermeneutical spiral, Figure 2.

Our pre-understandings for this study are primarily based on theoretical understandings derived from our studies at Linköpings Universitet and discussions with our tutor. We then made interviews with senior management at Tetra Pak Carton Ambient (TPCA) in order to gain contextual understandings. In Gummessons (2001) words this is second-hand understandings based on other people’s experiences. This since we did not have any own firsthand prior experiences of the packaging material business or project-based organisations and did not have the time to personally gather all the pre-understanding necessary for this study. An advantage of using second-hand pre-understandings is that
it enables us to go beyond our own experiences; a disadvantage is that impressions and facts can disappear on the way through intermediaries. However we tried to broaden the second-hand pre-understanding by using multiple sources, using both literature review and interviews. After the first interpretation and problem formulation we went out to do the field study and gained deeper understandings derived from the empirically collected data. These deeper understandings then form the base for the next loop in the hermeneutic spiral. The case study is further described in the chapter Research Design below.

**Research Design**

Given our explorative problem formulation that demands an understanding of parts and whole we chose to make a qualitative case study, a research method described by Merriam (1988) as an intense holistic description and analysis of a phenomenon or unit. She follows Shaw in the opinion that a case study aim at making interpretations in a context, and this is further convincing us in our choice (Merriam, 1988). The selected unit of study is one specific project, with reasonably defined boundaries, within the TPCA organisation. The following quote may serve as a presentation of our view on case studies:

“Cases for study (e.g., people, organisations, communities, cultures, events, critical incidences) are selected because they are “information rich” and illuminative, that is, they offer useful manifestations of the phenomenon of interest; sampling, then, is aimed at insight about the phenomenon, not empirical generalization from a sample to a population.”

(Quinn Patton, 2002:40)

Further on, case studies can be of different types. Our case study aims at gathering empirical findings that will be interpreted and analysed with help from theoretical perspectives, this type of case study can be described as interpretative or analytical case study (Merriam, 1998).

The reason for choosing case study as the basic framework for gathering data is two folded. Firstly, we believe that a case study possess the means to generate knowledge rich and thick enough that it will serve as a mean to fulfil our purpose. Secondly, TPCA showed a clear interest in providing access to this specific project, implicating that they
may be able to derive practical generalizations and experiences from this case study for how to run projects in their organisation. This can be illustrated by the following quote:

“While one cannot generalize from single cases or very small samples, one can learn from them – and learn a great deal, often opening up new territory for further research...”

(Quinn Patton, 2002:46)

Knowledge Creation
Two different yet interlinked ways to work when seeking new knowledge are deduction and induction. An important distinction between these two approaches lies in the starting point, the way the researcher uses theories in the research design. (Gummesson, 2001) Deduction starts in the theoretical field and through formulated hypothesis the researcher tries to test the theories towards the empirical reality. The data collection is theory driven with an aim to confirm, falsify or build on existing theories. Induction is on the contrary starting in the empirical field, or as Gummesson (2001) choose to call it: “real-world data” (Gummesson, 2001:62), with searching and probing with only some pre-understanding rather than specification of variables and expected relations in order to arrive at theory. (Quinn Patton, 2002; Lantz, 1998; May, 1993)

In practice there are few studies that uses only deduction or induction, rather the approaches are often combined, some questions beforehand defined in a deductively way and some topics left to explore inductively (Quinn Patton, 2002). Our study will be based on a combination of these and here Alvesson and Sköldberg (1994) puts forward the abductive approach as starting in the empirical field but also being open to theories in different stages of the research process. Since we did not have a full theoretical understanding of the field when starting the study, we were, as shown in our hermeneutic spiral, taking on new theories along the research process. According to Alvesson and Sköldberg (1994) this approach gives the researcher freedom to develop both the empirical results and the theories during the process. However, Gummesson (2001) stresses that the abductive research process should not be seen as a third approach but rather as the iteration between inductive and deductive approaches. Our research process will be of an abductive art, and in line with Starrin (1994) we believe that this approach will help us to reach a new genuine understanding of the problem and hopefully also new discoveries to add to the theoretical field.
Practical Procedures of Data Collection

The background for the choice of case to study is that we contacted Professor Lars Lindkvist at LiU School of Management, Linköpings Universitet, with the intention to carry out a study combining project management and knowledge management. Due to his previous research he believed that this kind of study would be of interest to TPCA. When approaching TPCA this was confirmed and the research process took its beginning. In order to give the reader a picture of how we have gathered the empirical data we will now turn to describing how we practically collected it, the dates and a more schematic view can be found in appendix 1.

We have in total made 20 interviews, ranging from 60 to 90 minutes each and we have also observed the everyday work in the project during a stay in Lund. We have made our data collection in four stages; on the first trip to Lund we had an open interview taking the form of a meeting with Connie Kristensson and Per Ciwesson, both members of the top management at TPCA in Lund. On this meeting two projects were selected to serve as study objects and on the second trip to Lund we interviewed representatives for these two projects as well as the Communications Director Linda Paulsson, this in order to get contextual information about communication in TPCA in general. After discussing the purpose of the study we found that one project was more appropriate to fulfil the purpose of the study, hence chosen as our case study object. The name of this project is Converting Standard Line – TBA³ and its purpose and structure will be described in more detail in the Empirical Findings in section IV. After this choice we went back to Lund a third time and conducted an additional interview with Jan Esbjörnsson, Project Manager of the CSL project. Then we went back for the fourth time and stayed for one and a half week, made interviews with the project members, made observations at the project kick-off, participated in meetings and went on a guided tour in the converting factory in Lund. We also worked in the open office area as soon as we did not conduct interviews or participate in meetings. During our stay we made several informal interviews with all the project members in addition to the formal interviews, both at the kick-off, in the open office and at the coffee machine. The informal interviews were made in order to get contextual information and a holistic picture of the project, and also to make sure that the opinions of the persons that we did not interview formally did not differ too much from the opinions of the persons

³ Hereafter called the CSL project. TBA is an abbreviation of Tetra Brick Aseptic, a certain type of package produced by Tetra Pak.
interviewed formally. We also conducted additional interviews with Jan Esbjörnsson and Linda Paulsson the last day before we left Lund.

We chose to use both observations and interviews and in order give the study variety and a wider perspective, this in line with Quinn Pattons (2002) recommendations of triangulation. The observations were made in order to get a holistic picture and an understanding of the context, and the interviews in order to find out the individuals’ perspective. In addition we have also made some documentary studies of internal material about TPCA and a Project Requirements Document for the CSL project to get contextual information as preparation for the interviews and observations. Besides the triangulation in methodology described above we also aim to use data both triangulation in the sense that we will interview different persons and theoretical triangulation in the sense that we will use different theoretical perspectives. Denzin, in Quinn Patton (2002), points out that a common misunderstanding of triangulation is that it should provide results pointing in the same direction, which he claims usually turns out quite the opposite, delivering opposing signals. An occurrence he concludes to be positive, thus this presents additional opportunities for insight rather than a weakening of results. We aim to use triangulation in order to achieve a deeper understanding and to illuminate factors and relations that would not have been noted otherwise.

The Researcher as an Instrument

“The perspective that the researcher brings to a qualitative inquiry is a part of the context for the findings. A human being is the instrument of qualitative methods. A real, live person makes observations, takes field notes, asks interview questions, and interprets responses. Self-awareness, then, can be an asset in both fieldwork and analysis.”

(Quinn Patton, 2002:64)

As stated in the quote above we have been the instrument for this case study performed through qualitative methods. Instruments calibrated in different ways gives different measuring results. In a qualitative study it is not possible to have an instrument that is neutral calibrated, at least not if the world is viewed upon from a non positivistic perspective as in our case. However, if awareness can be reached about the calibration of the instruments, meaning how our personal standpoints as researchers can affect the result, much can be won.
We agree with Lantz (1998), Merriam (1988) and May (1993) that in social qualitative research the balance between answering the research questions and to achieve and maintain a good relationship with the individual studied is an important, and difficult, balance to consider for the researcher. To make the relation between us and our interviewed and observed individuals clear, we have presented them with our intentions and reason for being there. This was done through opening statements distributed to all interviewees in advance, and to all people being observed in advance or in connection with the observation. This serves as reducing psychological uncertainty and building trust according to Lantz (1998). Following Quinn Patton (2002) we have kept the opening statements as simple, straightforward and understandable as possible to avoid making the respondents bored or anxious of the information presented (see appendix 2 and 3 for opening statements). Further on, May (1993) stresses the influence of factors such as gender, age, race and appearance in observations and interview situations. Since many of those variables are given to us by nature we have tried to elaborate on the variable ones such as appearance, which was done through dressing and acting to blend in at TPCA, the importance of dressing to blend in is further stressed by Holme and Solvang (1997). We will now turn to reflect upon the different methods in order to understand how this has affected our data collection and thereby the results attained.

**Observations**

We chose to make observations as a mean to get contextual information; the kick-off provided a lot of information regarding the project structure, goals and members. An advantage of observation is according to Quinn Patton (2002) the emphasis it gives to the context which is central to understanding the whole. Further on observations gives us the opportunity to see things that a respondent in an interview is either unconscious of, and therefore unable to tell us about, or conscious of but unwilling to tell us about in an interview situation (Merriam, 1988). It is also an opportunity to move beyond other peoples selective perceptions, though it is important to be aware of the fact that it is replaced by the researchers’ selective perceptions. However, through a combination of our perceptions as researchers and our respondents perceptions from the interviews we hope to get a holistic view of the object studied. (Quinn Patton 2002) For example we have both asked people about their experiences about meetings and participated in meetings and we thereby got a complementary picture to what the interviewees told us.
We also sat with our laptops in the open office area in order to observe how people interacted with each other.

Human perception is highly selective, how can we then claim that our observations are trustworthy and valid for analysis? Quinn Patton (2002) points out the importance of preparation, and that it is required in many dimensions such as mental, physical, intellectual and psychological. We prepared observation guidelines (see appendix 6) in advance in order to focus and structure our observations and in order to help our memory we went through our notes and discussed the observations after each day at TPCA. Since observations are practically impossible to fully record and document, a rising need for reflection and introspection is posed on the researchers conducting the observations. The researchers will develop a deeper understanding and change during the observations, therefore May (1993) stresses the importance of taking introspective field notes. Space for such notes was included in the observation guideline.

**Interviews**

“To **inter-view** also have the meaning to see one another”

(Lantz, 1998:159, own translation, her emphasis)

“The purpose of interviewing, then, is to allow us to enter into the other person’s perspective. Qualitative interviewing begins with the assumption that the perspective of others is meaningful, knowable, and able to be made explicit. We interview to find out what is in and on someone else’s mind, to gather their stories.”

(Quinn Patton, 2002:341)

These quotes are making it clear that interviewing is all about absorbing and taking in another person’s perspective. There are no objective truths to obtain through an interview but rather someone’s personal perspective, this is important to be conscious of when analysing the data collected.

Interviews can be conducted in various ways and different forms. The different forms of interviews are classified in various ways according to different authors. Merriam (1998) is describing interviews as more or less structured, ranging from fully structured when using a survey-based approach and unstructured when the researchers pre-understanding
is not enough to ask structured questions. Moreover, the approaches is not mutually exclusive, but rather possibly to combine both in the same study and also in the same interview, for example when a structured interview starts with yes- or no-questions and ends with an unstructured open-ended question about an experience of an phenomenon. (Quinn Patton, 2002; May, 1993)

We believe that the important thing in choosing the form of interview is not how to label the form of interview but rather to be conscious of what effects the different ways of asking questions can have on the results obtained.

Our first interview with the senior management and the first interviews with the project managers were unstructured where we tried to understand the reality and the context of the projects at TPCA. The advantages of this kind of interview are the flexibility offered, the possibilities to capture the respondent’s opinions on what is important and that contextual information can be obtained. (Merriam, 1988)

The second set of interviews conducted with the project manager in the CSL project and the project members of the CSL project were more specifically focused on mapping and understanding each individual’s communication patterns, why these constitutes as semi structured interviews to which we gave the frame and direction based on the interview guidelines (see appendix 4 and 5) we used as foundation for the interview. Time was also set aside at end of each interview for more open directed questions and to hear additional comments from the interviewees, this was done in order to maintain flexibility and to not miss out on unexpected findings.

May (1993), following Cannell and Kahn, Claus Moser and Graham Kalton, describes the following three conditions as necessary to successful interviews:

**Accessibility** – does the interviewee have the information sought?

**Cognition** – does the respondent understand what are requested of him/her?

**Motivation** – does the respondent feel that his or hers participation and answers are valued?

We have used these conditions as guidelines when planning what persons to interview, how to prepare the respondents and in what questions to ask and how to act during the
II METHODOLOGY

interview. Together with the project manager of the CSL project we plotted the project and got an idea of whom to interview, thereby seeking to fulfil the accessibility criteria. Since we asked about communication patterns in a project they were participants of, we believe that all respondents had the knowledge sought. When it comes to cognition, we hope that our opening statements that were presented to all respondents in advance helped to make our expectations on the respondents clear so that they could concentrate on the task rather than the context. If an interviewee is uncertain of what is demanded of her/him this can give an uncomfortable feeling that affects the answers given, and the opening statements thereby not only fulfils a practical purpose but also an ethical and a theoretical one (May, 1993). We also explained the context of our study and the fact that this study is supported by senior management in order to raise the motivation of the respondents. In order to avoid being viewed as spies from the management we also stressed that even though we operated on a mandate given to us by their management, our main role was the one of a university researcher. Further on we also guaranteed anonymity, in the sense that the opinions expressed by the interviewees and the quotes cited from the interviews conducted would be presented in an anonymous way so that the reader of this report can not know who said what. This anonymity was guaranteed in order to make the interviewees feel more comfortable with the situation, and consequently the quotes in the empirical findings are left without source. We also repeated and summarised the answers regularly throughout the interview in order to validate and also hopefully to give higher motivation and indicate the passes from a stage of the interview to another. (Lantz, 1998)

Literature Review

Our theoretical foundation for this study may in general terms be described as the knowledge accumulation built up during the course of our four years as business students at Linköpings Universitet, but more specifically derived out of the last years focused master studies of strategy, management control and knowledge and change in an organisational perspective.

Through these studies we have developed a pre-understanding and an increased interest for studies concerning the creation of competitive advantage through the superior handling of knowledge in project-based organisations. This overall understanding was then followed up by a broad theoretical search in academic peer-reviewed journals collected through the Business Source Premier and Scopus databases which we had
access to from the home page of the library at Linköpings Universitet. The most appropriate and useful theories were then selected and is presented and elaborated on in our frame of reference. It has been our objective throughout the whole process to seek broad and wide in order to collect and combine knowledge in new ways and to improve our ability to draw insightful and valid conclusions from the interwoven experiences of theory and empirical data. We have felt this theory development process to be an intriguing and stimulating journey of constant learning, but foremost it should be viewed as the most adequate way, given the qualitative and explorative nature of the study, to derive learning’s applicable to both practitioners within the field and to future academic endeavours.

**Interpretation and Analysis**
After asking the interviewees for permission we recorded the formal interviews with an Mp3 player. After thoughtful consideration we decided to gather the empirical findings from the interviews by listening to the interviews together, transcribing the answers to key questions and also other more unexpected interesting answers from the interviews word by word, while leaving out discussions that did not contribute to the answering of our research questions. Further on we noted discussions that could be of interest and the time of them in order to be able to return to the files if we would find that things not transcribed word-by-word would be important later on in the process, this method is suggested by Merriam (1998) when time is too short to fully transcribe all the interviews. It was however not time delimitations that led the choice of transcribing only parts of the interviews, we would have had time to transcribe all the interviews if we had chosen to listen to them one by one. We valued the opportunity to listen together and discuss the findings higher than having all the interviews transcribed fully, especially since the empirical material were rather extensive and that the discussions about what was important was needed in order to structure and put together the empirical findings in an meaningful way.

Besides listening to the files we also reread our field notes from the observations and the informal interviews when starting to put together the empirical findings that are found in section IV. We will use quotes from the formal interviews rather extensively in order to give the reader opportunity to freely interpret the words of the interviewees.
II METHODOLOGY

The theories that we present in the frame of reference, section III, will then be used in the analysis in order to interpret and analyse the empirical findings. We have also added personal thoughts and ideas, developed along the way, in the analytic discussions.

**Methodology Overview**

In order to summarise and remind the reader of our choices we summarise the methodological choices and the disposition of the methodological chapter Figure 3. In the next chapter we turn to reflect upon these methodological choices and discuss the results of the study.

![Figure 3 - Summary of the methodology chapter](own figure)

**Methodology Discussion/ Critique**

So far in this chapter the scientific approach, the research design and the practical procedures of data collection have been discussed. Now we turn to discuss the weaknesses that the used method can imply.

**Depth and Detail of the Study**

According to Merriam (1988) the case study gives insight and enlightening in a way that broadens the knowledge of the reader, but there are of course also delimitations of the application possible from the case study. She points out that even if the researcher strives toward a rich and thick description and analysis of a phenomena or unit he or she might be delimited by time or budget restrictions. This study consists of a case study of one single project. We have spent in total two weeks studying the CSL project on the field and made formal semi-structured interviews with 13 of the project members. The fact that we have not interviewed all the participants of the project can be criticised, but
since we have tried to cover different parts of the project with the formal interviews and in addition made several informal interviews with the participants we believe that we have reached enough depth in the study of the CSL project to draw valid conclusions. Thereby we had more time to go deeper into the interpretation and analysis of the formal interviews made. We chose to focus on one case study given the limited time available for this study which was 20 weeks.

Quality in Qualitative Studies – Validity and Reliability

Validity is traditionally about if the results of a study are in accordance with the reality, do the results capture what is there, does the researcher measure what she or he seeks to measure? Reliability is about if ones results can be obtained when repeating a study. These concepts are traditionally coupled with a positivistic view, and are more problematic when conducting a qualitative study with a departure point in hermeneutics as we do here. (Merriam, 1988) Some even claims that validity and reliability is useless to consider in a qualitative study (Thagaard, 1998 in Jacobsen, 2002).

We have however chosen to discuss these concepts from a qualitative perspective starting with validity. We will discuss this in relation to two of the validity criteria in qualitative studies suggested by Larsson (1994) to discuss the results of the study, namely the heuristic value criteria and the pragmatic criteria. The validity according to the heuristic value criteria is about whether the reader through the study can see any aspect of reality in a new way, meaning that the analysis results in a new way to see reality and new categories for thinking and talking about the subject. The pragmatic criteria is emphasising the consequences of the results obtained in a study, about how the researcher has been able to present their results to practitioners and what importance the results have in reality. Here the classification is sprung out of Habermas distinction between different knowledge interests where we are classifying our study as a result of a practical-hermeneutic knowledge interest, aiming at:

“...improve communication through contributing with interpretations, conceptions of the world that can generate platforms for understandings between people. Here the validity lay in that the interpretation through its qualities is capable of creating such a platform for the conversation.”

(Larsson, 1994:185, own translation)
Larsson (1994) further points out that the validity for such a study depends on whether the analysis has the qualities to create such understandings for a conversation. Our aim with this thesis is to explore the subject communication in project-based organisations and to discuss practical implications of these findings. In the analysis, see section V, we will put forward a practical framework for discussing and managing communication in project-based organisations, consisting of a vocabulary and a conceptual tool aiming at create a discussion on the subject of communication. We believe that this will give the reader the opportunity to see reality in a new way as proposed by the heuristic value criteria and that TPCA will have practical use of the conceptual framework as suggested by the pragmatic criteria and therefore we argue that the validity according to these criteria is high. However, since we cannot be sure of how the readers or the organisation of TPCA will interpret our study it is left to the reader and the organisation of TPCA to conclude whether they agree or not.

Now we turn to discuss the concept of reliability, above we concluded that the traditional view is hardly accurate when it comes to qualitative studies. It is not probable that a new qualitative study will give exactly the same results as our study since researchers always affect the study’s results (Jacobsen, 2002). Thus, instead of discussing reliability in the sense that someone else would have obtained the same results we will instead follow Merriam (1988) in discussing reliability in the meaning that the results have an meaning, that the are consistent and dependant. We have strived towards this by using three techniques presented by Goetz and LeCompte (1984, in Merriam, 1988); triangulation in the gathering of data, presenting our position as researchers in the sense of pre-understandings and selection of study object, and also by the detailed description of how the gathering of data has been conducted presented earlier in this chapter.

Further on, we believe that the recording of interviews and the structured field notes following Jacobsen (2002) contributed to the quality and reliability of the results in the sense discussed above. We thereby believe that the empirical findings to a certain extent could have been similar when gathered by other researchers. However the interpretations and discussions presented in the analysis is highly interwoven with our own thoughts and ideas and as described above in connection with validity we aimed at presenting new ways of looking upon the reality why we believe that the interpretation of the empirical findings could have been rather different by other researchers. Since we
believe that our conclusions would not certainly be obtained by other researchers, how can the reader then measure the reliability of this study? According to Larsson (1994) a way of judging the quality of a qualitative study is the criteria of *intern logics* meaning that harmony between the parts of the study is present and that the argumentation follows the rules of logic. We have sought to as far as possible explain our choices, relate the different parts of the study to each other and discuss our findings thoroughly in the analysis in order to heighten the intern logics in this study.

Finally we would like to add a few words about our relation to TPCA where we conducted our case study. The reader might wonder if and in that case how we have been coloured of TPCA’s opinions when formulating our problem and performing the case study. This is a question that is important for the credibility of the study. On the first meeting with TPCA it was clear that we had a shared interest in the subject of communication and that TPCA saw this study as an opportunity to get a pre-understanding of the subject. However we want to put forward that after that first meeting we were free to design the problem formulation and procedures of the study within the agreed subject and the decision to focus on only one of the two projects selected from the beginning were our own.

**Source Criticism**

We have throughout this research process used many different sources. How can we know that these sources are reliable and useful? Source criticism is according to Thurén (1997) a collection of methodological rules that can be used to find out what is true, or at least what is probable. Amongst other he puts forward two criteria to value sources from, if the sources are independent and authentic. The authentic criteria means that a judgment of whether the source is what it claims to be, that it is not fake or made up. Leth and Thurén (2000) further claims that it is even more important to judge the source when it is retrieved from the Internet. We have strived to judge if the sources in this study is authentic by using online encyclopaedias and peer-reviewed articles from databases reached through the library at Linköpings Universitet. We have also checked the choice of literature with our tutor at the university, who has more pre-knowledge in the theoretical field, in order to secure that the authors is recognised and trusted in the academic community. When it comes to the internal material from Tetra Pak and TPCA it is hard to check the authenticity but since the information gathered from these sources
serves as background rather than a contribution to the analysis we believe that this has not affected the results in any negative way.

The other criteria, independency, implies that the source should stand for itself and not only be a reference from another source. We have here tried as far as possible to go to the original source and only in the cases when we have not been able to get hold of the original, used references from other sources. Further on, Alvesson and Sköldberg (2000) stress that the source should be valued by the distance both in time and physical space, and here we have tried to as far as possible use new literature on the area, something that felt extra important since our study is of an exploratory nature and there is plenty of new research in that field. The fact that a lot of the literature is written by authors from other countries than Sweden has not by us been regarded as a problem since we have checked the authenticity as described above.

**Practical Implications of the Study**

Since the aim of research is to create new knowledge it is an important question whether the result of the study is applicable also on other phenomena’s, and if the results are useful or not. Here we want to return to the quote of Quinn-Patton (2002) cited under Research Design where he states that case studies cannot be generalized, but that one can learn a lot from them and also open up for further research. Thus we state that the main goal of this study is not to draw general conclusions or create a general theory. We rather follow the standpoint of Brunsson (1982) in the notion of business research as a cultivation of language instead of as a reproduction of reality. This notion were proposed by Brunsson (1982) with the background that the traditional, positivistic view on business research as reproducing the reality implies a paradox where almost all studies need to be excused with the notion of that the results have to be viewed as hypothetic or preliminary. The idea of business research as language cultivation is stemming from the idea that social science should affect and change the social systems of reality, and that an important way to do this is by creating a language in order to describe and understand the social systems of reality and also to provide the language to the actors within these systems. Further on Brunsson (1982) claims that this cultivation of language should be resting on a solid empirical ground built on reproduction of the reality. The reproducing is in this perspective changed from being the purpose of the research to being the mean to reach the cultivation of the language with.

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4 Own translation from the Swedish words *språkbildning* and *avbildning.*
Brunsson (1982) means that abandoning the traditional view that one should be able to generalize from research results does not imply that it is uninteresting to be able to use the results in other contexts than the one present in this study, but rather that the demand for generalization is replaced by the flexibility criteria. This means that the formulation of the theory needs to be flexible in a way that makes it usable to other areas. This criterion is hard to evaluate before the usage has been tried out.

Following Brunssons (1982) ideas, we will put forward a practical framework including a vocabulary in our analysis, see chapter V. Furthermore we will present these findings to the actors within the system studied, meaning the participants of the study at TPCA in Lund in connection with our fifth and last visit to Lund, see appendix 1. Finally we hope and believe that our findings can be used as tools applicable to enlighten aspects of communication also in other contexts than TPCA, foremost in other project-based organisations but maybe also in other contexts if we succeed in our aim in fulfilling the flexibility criteria.

Now that we have described our view on science, the practical procedures of our way to conduct our study and discussed the methods it is time to turn to the frame of reference in section III. But first we want to conclude the methodological section by presenting a quote on what it is all about and that illustrates our view upon business research and has guided us through our research process:

“Practical applications of qualitative methods emerge from the power of observation, openness to what the world has to teach, and inductive analysis to make sense out of the world’s lessons. While there are elegant philosophical rationales and theoretical underpinnings to qualitative inquiry, the practical applications come down to a few very basic and simple ideas: Pay attention, listen and watch, be open, think about what you hear and see, document systematically (memory is selective and unreliable), and apply what you learn.”

(Quinn Patton, 2002:203)
III FRAME OF REFERENCE

Mankind’s never ending quest of explaining the world around her has led to a wide array of theories about nuclear physics, psychology and literature as well as about the presence of firms and organisations. These theories can be regarded as an attempt to explain the reality by simplifying it and describe it with figures and models, thereby helping the human brain to cope with complex information. In this chapter we will present a frame of reference that has served as the theoretical foundation for understanding and analysing the reality of our case study, the CSL project. Our aim is not to give a full description of the selected theories but rather to present relevant parts of theories, relate them to each other and reflect upon them in a way that contributes to the analysis.

Introduction

We believe, as noted in the methodology chapter, that in order to understand parts one must also understand the whole picture. Therefore this section begins with a presentation of the concepts of projects and project-based organisations. These concepts are in our case the structures which Whittington (1998) argues constitutes the frames within which individuals operates. The purpose of presenting them is to give the reader a background to the context in which individuals in our case study operates. Further on, a pre-assumption for this thesis is that a key driver for competitive advantage is the ability to coordinate and leveraging knowledge into market focused solutions. We will therefore continue the chapter with some views upon knowledge management and thoughts on how knowledge can be managed, which in our view is achieved through communication. With the increased understanding of the context and also the purpose of communication in project-based organisations we will turn to theories on communication, focusing on the choice of channels from an individual perspective. These theories will be central in analysing the project members’ individual choice of communication channels. Each chapter will be concluded with some summarising thoughts.
Before turning to the areas described above we want to illuminate the notion of *bounded rationality*, which Herbert A. Simon introduced in 1947 and received the Nobel Prize for in 1978 (ne.se). The term bounded rationality describes the fact that the human brain has a limited ability to store and process information, and this is a central assumption for the thoughts in this thesis (search.eb.com2). Simon notes that bounded rationality is “the limits upon the ability of human beings to adapt optimally, or even satisfactorily, to complex environments.” (Simon, 1991:132)

Grant (1996) discusses the principle of bounded rationality in relation to knowledge:

> “Fundamental to Simon’s principle of bounded rationality is recognition that the human brain has limited capacity to acquire, store and process knowledge. The result is that efficiency in knowledge production (by which I mean the creation of new knowledge, the acquisition of existing knowledge, and storage of knowledge) requires that individuals specialize in particular areas of knowledge. This implies that experts are (almost) invariably specialists, while jacks-of-all-trades are masters-of-none.”

(Grant, 1996:112)

The concept of bounded rationality has been widely recognized and used by other researchers, however there are voices raised that it is perhaps still not used enough. Grandori (2001) states this opinion in an introduction of a special issue dedicated to the memory of Simon:

> “One of the reasons why Simon’s contribution has not been fully utilized in economics and organisational-economic studies, is that is has been perceived as a merely ‘descriptive’ theory, which therefore cannot seriously challenge or communicate with the normative, or at least prescriptive, science of economics.”

(Grandori, 2001:206)

With this background we believe that the notion of bounded rationality is essential to consider when the area of interest is human beings and their choices and behaviour. When having recognized this, we now turn to the first part in the frame of references which will give some perspectives on the context in which individuals in a project-based organisation operates.
1. Perspectives on Project-Based Organisations

As the reader already knows this study is focusing on projects in project-based organisations. A project can be described as “...a temporary undertaking which is performed in order to create a unique product or service” (PMI\(^5\) in Berggren, 2001:17, own translation) according to PMI. The project triangle illustrated in Figure 4 shows that a project implies a delicate balance between functionality, time and cost. In practice this means that a specific result should be reached in a specific time and according to a specific budget. Lindkvist (2001) states that some reasons for the existence of projects is that they help companies to become more flexible, adaptable and that they simplify the context which is positive when human beings have an bounded rationality.

![Figure 4 - The project triangle](Berggren, 2001:17)

Many projects are set up for a specific task and once the goal is reached the group is dissolved and do not reconnect again for further work, for example when a firm has a very complex multidisciplinary task to solve that needs specialized knowledge from different departments. However there are also projects conducted within the frame of an organisation that organise most of their activities in projects and/or have an emphasis on

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\(^5\) Project Management Institute – an American institute that since 1969 has been aiming at introducing and spreading a global standard for how to define and manage projects. (www.pmi.org; Ricciardi & Schaller, 2005)
the projects rather than the functional line organisation. In these organisations people are likely to meet and work together again even though they belong to different functions. These are usually referred to as project-based organisations and the number of such organisations is growing. (Sydow et al, 2004)

Even though organisations that uses projects as a mean to reach their goals gets more common, Bresnen et al (2003) concludes that surprisingly little attention has been directed to the specific field of project management when it comes to managing knowledge. However, recently this has been more addressed and the field is now expanding. Projects are viewed as a fast and flexible way of organising knowledge resources. (Sydow et al, 2004)

**Projects as a Part of Surrounding Structures**

The project-based organisations is exposed to dilemmas of balancing different forces, an obvious example of this is the balance between the autonomy of the project and its embeddedness in and dependency on surrounding structures. There are according to Sydow et al (2004) at least four different levels that can be considered when investigating the embeddedness in a project-based organisation: organisational units, organisations, interorganisational networks and organisational fields. At the organisational unit level, business or functional units can be distinguished, where a functional unit often is more specialized. If we turn to the organisational level a possible distinction is between mechanistic or organic organisational types which provide quite different contexts for a project. This embeddedness in organisational level is worth considering, not least since projects often are expected to contribute to renewal of the organisation. At the third level, interorganisational networks refer to both strategic networks and project networks that both can cut through organisational boundaries. Finally, organisational fields can for example consist of industrial or regional settings. Also national business systems are on the level of organisational field and can provide a special context for projects. (Sydow et al, 2004)

Even though a project by definition is a temporary undertaking there is often the case that a member in a project also is a member of one of the surrounding structures presented above (Sapsed et al, 2005). This has an impact on project work. The structures surrounding the projects does not disappear and reappear when a project start and stop, in the same way as a individuals family and social life has an impact on work,
the embeddedness in surrounding social structures has an impact on the project. In a case study performed by Bresnen et al (2003) the findings were that these social structures, in that case a network of engineers, played an important role in the knowledge sharing and that the attempts to direct knowledge through formal data bases were not very successful. Instead of using the database for knowledge and information searching the engineers chose to go through interpersonal forms of contact outside the project. This result implies that the embeddedness in larger contexts is an important feature well worth considering when studying projects’ knowledge flow and choices of communication channels in project-based organisations.

**Types of Groups**

Given the assumption that networks and social structures can play an important part in information flow and communication we believe that it is of interest to look upon which kind of groups that can exist in project-based organisations. We will here use the distinctions of *Communities of Practice* (Brown and Duguid, 1998) and *Collectivities of Practice* (Lindkvist, 2005), following Lindkvist (2005) who with help from these concepts develops a knowledge organisation typology in the aim of offering an analytical tool or lens through which empirical findings can be discussed and/or highlighted. First we describe the notion community of practice as a group where know-how and sense-making is shared and where working together make it possible to use their tacit\(^6\) know-how.

> “Through practice, a community of practice develops a shared understanding of what it does, of how to do it, and how it relates to other communities and their practices – in all, a ‘world view’. This changing understanding comprises the community’s collective knowledge base”

(Brown and Duguid, 1998:96)

This community need not to be explicit, often the members of the community are not aware of that they form a community, and the communities does not necessary follow the organisation schedules and existing project groups but can be built on other grounds. Shared view and understanding forms the base for such a community, it is tightly knit groups which demands that people have shared tacit knowledge and often demands that

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\(^6\) Tacit knowledge is referring to knowledge that is hard to articulate and is further described in the chapter *Perspectives on Knowledge Management*
they have been working together for a time long enough to develop these tight couplings. (Brown and Duguid, 1998) This view has been widely adopted as an alternative to the more codifying and structuring approach to knowledge (Lindkvist, 2005).

The characteristics of projects and thereby project organisations is the temporary art of the working groups and the project may therefore not possess the ability to form the tightly knit groups that Brown and Duguid (1998) names communities of practice. Lindkvist (2005) discusses this and offers the alternative notion of collectivities of practice. By this he highlights that project work may imply that groups with diversified knowledge bases and specialized competences will have to work together without the common knowledge base that according to Brown and Duguid (1998) forms a community of practice. He further specifies that autonomous, relative time restricted and goal oriented projects with members who do not know each other from before, forms such a collectivity of practice. The base for cooperation in a collectivity of practice is the strive for achieving shared goals, rather than common tacit knowledge, and the organising is done much through self-organisation. (Lindkvist, 2005)

Lindkvist (2005) puts these two concepts in opposition to each other by placing them on each side of a scale and sets out community of practice as an organisation type of knowledge community at one end and collectivity of practice as an organisation type of knowledge collectivity at the other end. However, the empirical cases are often mixed but in order to create a typology the two forms is held clear aside. It is also worth noting that the framework is developed strictly at a group level. The knowledge community is characterized by tacit embodied knowledge that resides in practice and is summarised by the epistemological maxim that we “know more than we can tell” (Polanyi, 1966 in Lindkvist, 2005:1197). The knowledge collectivity on the other hand is more characterized of distributed knowledge, the ability to coordinate different individual knowledge bases. Here Lindkvist (2005) builds on a phrase of Bartley (1987) when forming the epistemological maxim that “we tell more than we can know” (Lindkvist, 2005:1204). Lindkvist (2005) concludes with the idea that the knowledge community with its focus on group knowledge that takes time to develop may be more suitable in stable circumstances and that a more rapidly changing environment might demand the more market-like knowledge flow that characterises the knowledge collectivity.
Summarising Thoughts

In this chapter we have presented a definition of projects and some features of the project-based organisation, focusing on the embeddedness of projects in larger structures. We will now couple the discussion of communities and collectivities of practice to the embeddedness phenomena. The project is by definition and nature temporary which implies that a collectivity of practice rather than a community of practice is the common characteristic of a project group. The complicating thing is, as Lindkvist (2005) notes, that in real situations this analytical distinction can not be made as clear. In a project-based organisation there can be projects that have never met before and are only united by a shared goal, but there are also the possibility that some or all members of the project have worked together before and form a community of practice. When looking upon a project-based organisation from this perspective it is interesting to note that there are probably both communities of practices and collectivities of practices present in a project-based organisation, and that a member can be a member of both communities of practice and collectivities of practice at the same time. Not only projects may show these characteristics, also the embedding structures described earlier may be discussed using the same typologies.

To sum up, the result from Bresnens (2003) study, the discussion on communities and collectivities by Brown and Duguid (1998) and Lindkvist (2005) and the notion of embeddedness as brought forward by Sydow et al (2003) are all factors that need to be taken into consideration when studying communication in project-based organisations. Having provided this general background of project-based organisations we will now move into these types of organisations and highlight for what purposes communication is conducted.

2. Perspectives on Knowledge Management

Knowledge is a broad concept that can be interpreted and analysed in many different ways. It is highly debated and has been under the lens of discussion for over two thousand years, from Plato to Popper (Grant, 1996). As noted earlier, we are taking our departure in Grants (1996) knowledge-based theory and take the standpoint that how organisations use their knowledge to solve their problems is one of the key factors for competitiveness why it is interesting to study how
knowledge can be managed. In this part we will discuss the concept of knowledge, how it can be managed and coordinated and also the difficulties in moving knowledge across boundaries. The chapter is concluded with a few summarising thoughts.

The Concept of Knowledge
There are different types of knowledge, and we have here chosen to bring forward the commonly used distinction between explicit and tacit knowledge. The explicit knowledge is possible to articulate and express, and can be referred to by the expression *know-what* whereas the tacit knowledge is hard to articulate and embedded in practice and can be referred to as *know-how* (Brown and Duguid, 2000; Tell and Söderlund 2001). In addition to these concepts we also want to bring forward a distinction made by Grandori (2001) where she divides knowledge complexity into computational and epistemic knowledge complexity. When describing the computational complexity she is inspired of Simons (1962) notion of the bounded rationality:

“The computational complexity refers to the number of elements and symbols, and of the possible connections between them. It makes the storage and transfer of sharing of such difficult without support to the limited, computational ability of the mind (documents, programs).”

(Grandori, 2001:391)

These features of the computational complexity means that informal communication which is unsupported by memories, tools or formalization languages does not succeed in managing this kind of knowledge complexity. Epistemic knowledge complexity on the other hand refers to the process of observing phenomena and finding cause-effects relations, and from this construct valid and reliable knowledge, a difficulty that researchers are well familiar with. Links can be drawn between computational knowledge complexity and explicit knowledge and between epistemic knowledge complexity and tacit knowledge. However, Grandori (2001) stresses that the notion of epistemic knowledge complexity adds an extra dimension to the concept tacit knowledge, namely that it is hard to find valid explanations and not just to communicate it.

Coordinating Knowledge
Grant (1996) divides the knowledge concept into the two mechanisms of coordination and cooperation in his proposal of the knowledge-based theory. He states that
cooperation has been thoroughly examined by organisational theorists but that coordination has been left behind, even though it is at least as important. He then discusses four mechanisms of integrating specialised knowledge, helping the mechanism of coordination, these are:

**Rules and directives:** These mechanisms aim at minimize the need of communication and includes plans, schedules, forecasts, rules, policies and procedures. Also standardised information and communication systems, and then not only in a technological sense, are included in the mechanism of rules and directives. These regulate the interactions between individuals and can beyond the minimized communication also serve as a mean to articulate tacit knowledge.

**Sequencing:** This implies that every specialist has a specific time to make their contribution and is one of the simplest ways to coordinate while minimizing communication. It does demand, however, that the production process allows such separation.

**Routines:** Routines includes a behaviour initialized by a signal, regardless of rules, directives or direct verbal signals. It can be described as the grammar of action and consist of many different variety of responses.

**Group problem solving and decision making:** This mechanism differs from the previous in that it does not try to minimize communication, and is mostly used for high complexity tasks and often taking the form of meetings.

To summarise, the first three mechanisms seeks to minimize the cost of communication and common knowledge, whereas the fourth mechanism is demanded if a high level of tacit knowledge is to be used for the solution. Common knowledge allows individuals to share and integrate the knowledge which they do not have in common. It can be language, other forms of symbolic communication, commonality of specialised knowledge and recognition of individual knowledge domains. Grant (1996) points out that the main contribution of the knowledge-based theory, concerning the discussion of mechanisms, are the recognition of the costs and difficulties of communicating tacit knowledge.
Knowledge Boundaries
Carlile (2002) states that “knowledge is both a source of and a barrier to innovation” (Carlile 2002:442) and discuss that the same characteristics that enables problem solving within a function can hinder it between functions. This phenomena forms so-called knowledge boundaries. Carlile (2002; 2004) further develops an integrative framework for managing knowledge across boundaries, stemming from the desire to understand innovations with the boundaries described as syntactic, semantic and pragmatic. Then he couples the processes of transfer, translation and transformation to the three types of knowledge boundaries. (Carlile, 2004)

The syntactic boundary stems from an information-processing perspective, the technology-based approaches which focus has been transferring and storing knowledge through the use of data bases and electronic device. However, the transfer demands that the sender and receiver have common knowledge in the form of a lexicon in order to transfer the knowledge. But even with the right lexicon the transfer of knowledge is not always enough to share specific knowledge, and then you stand in front of a semantic boundary. (Carlile, 2004)

When it comes to the semantic boundary the process of translation is essential. This boundary recognizes the difficulty that arise when actors has different interpretation of words, this limits the management of the knowledge flow. This is inspired of Dougherty’s (1992) thought worlds where people’s different backgrounds make it difficult to understand and cooperate with other functions that do not share the same tacit knowledge. However, even if you understand what another person means it is not certain that it is enough to manage knowledge. Sometimes different political interests, motivation and existing knowledge can hinder this process and negotiating of interests and trade-offs between actors are needed to solve these conflicting views. (Carlile, 2004)

Then we have reached the pragmatic or political boundary which demands the process of transformation. At this boundary knowledge is invested by an actor and not easily changed, the individual costs of changing a view includes both the cost of learning something new and the cost of abandoning current invested knowledge. If there are pragmatic/political boundaries present, the knowledge sharing across these boundaries will therefore be difficult and costly. (Carlile, 2004)
Carlile (2004) further claims that a firm’s capability of handling knowledge at a boundary can be described as the capacity of common knowledge (lexicon, meaning and interests) times the actors’ ability to make use of that common knowledge or expertise. This formula, capacity times ability forms the capability to manage knowledge across a boundary. The capacities of common knowledge and the abilities of actors to use this common knowledge are thereby according to Carlile (2004) the most important factors for understanding how knowledge can transform from old to new knowledge. Complicating this notion is the path-dependent nature of knowledge which makes actors reuse old knowledge even when new circumstances are present. This framework of knowledge boundaries is developed as an analytical help of considering the knowledge process. (Carlile, 2004)

**Overcoming Knowledge Boundaries**

After going through the idea of knowledge boundaries we will now turn to discuss ways of overcoming them. Brown and Duguid (1998) is emphasizing the social in spreading knowledge between communities and thereby overcoming the knowledge boundaries. They mean that translation, brokering and boundary objects (terms borrowed from the sociologists Star and Griesemer) are social strategies that can be helpful in this respect. (Brown and Duguid, 1998) Translators are people who can see the interests of two or more communities, and also has the ability to understand the complexity of the different knowledge bases involved. A good translator is hard to find because often he or she is not neutral and the other side can thereby have a problem in trusting this person. This problem is not as evident for the knowledge brokers since they are involved in the actual work and therefore affected by the consequences of their actions or the messages they carry. These knowledge brokers exist where there is an organisation overlap and they participate in different knowledge areas.

Boundary objects are objects that are of interest to each community involved but maybe with different importance or significance to different groups. The concept of boundary objects was formed by Star & Griesemer (1989), described as an analytical concept of scientific objects, concrete or abstract, which can serve as simultaneously representation for coupled social worlds and still satisfy the informational needs of the different worlds. The boundary object concept has been developed and used by many authors in explaining and solving knowledge transfer difficulties around knowledge boundaries. Brown and Duguid describe it this way: “To help produce intercommunal negotiation,
organisations can seed the border between communities with boundary objects” (Brown and Duguid, 1998:104). They further describe the business processes in the role as boundary objects of their own, processes can provide structure. However, they will not be serving as good boundary objects if improvised negotiations are not allowed. They warn for getting stuck in “frozen negotiations” (Brown and Duguid, 1998:104) which can lead to rigid procedures and not at all facilitating the intercommunal negotiation but rather the opposite.

However, the boundary object is not always as simple as it sounds, it is not possible to just grasp an object, name it boundary object and believe that it will work. Carlile (2004) concludes that a boundary object is not always a “magic bullet” (Carlile, 2004:565) if the capacity of the common knowledge and/or the ability of the individuals are not enough or well matched. Sapsed and Salter (2004) examined project management tools as boundary objects and found that a boundary object is not as easy as to just use, it needs to be maintained with the help of authorities and that if the objects is not supported by management and/or not combined with face-to-face interactions they did not work as boundary objects. They further conclude that the boundary object needs to be flexible in a way that answers to the complexity of the task.

**Summarising Thoughts**

We have now presented some perspectives on knowledge and how it can be managed. Grants (1996) four coordination mechanisms have been presented where the first three, rules and directives, sequencing and routines aimed at minimizing the level of common knowledge needed and the fourth of group problem solving and decision making demanded more common knowledge in order to make use of tacit knowledge. Common knowledge can consist of recognition of others knowledge domains or common specialized knowledge as well as of common language and other forms of symbolic communication. We have also presented Carlile’s (2002; 2004) thoughts on knowledge boundaries as syntactic, semantic or pragmatic. Here we see that common knowledge in the form of language or symbolic communication can be used to overcome a syntactic boundary, and that common specialized knowledge can be a help in translating and thereby crossing the semantic boundary. It can also be noted that a translator might help at a semantic boundary. The pragmatic boundary, however, seems harder to cross just with the help of common knowledge or a translator. Perhaps a broker, which is himself
involved and affected of the results from both sides of the boundary, could help in overcoming such a boundary?

In the discussion of how to overcome knowledge boundaries it is also interesting to return to the discussion of communities and collectivities of practice which was described in the chapter *Perspectives on Project-Based Organisations* (based on Lindkvist, 2005). Communities of practice seem to have no boundaries within but might face the risk of creating pragmatic boundaries around itself, especially if it is very tightly knit. Collectivities of practice, on the other hand, might have many knowledge boundaries of different types running right through it since it can contain many different specialists from different knowledge areas. Arguably it can be worth devoting some effort to develop common knowledge in the form of language and/or symbols that can be used when moving across syntactic boundaries. Finally, following Grant (1996), it is worth noting that it is a delicate balance that needs to be found between coordination knowledge without trying to make everyone learn what the others know but still make use of the tacit knowledge in the group.

3. *Perspectives on Individual Choice of Communication Channel*

The concept of communication includes a wide range of activities. Everything from a conversation between two friends or a world wide marketing campaign to communication conducted for coordinating activities and solving problems at work can be defined as communication. However, the human being performing the communication is the same whether it is in a relationship or at work, and the theories about how a human brain handles information can therefore be said to be general. In this chapter we will start by presenting the different elements of communication and then move on to focus on the element of channel, which will be discussed from two major theories; *Media Naturalness* and *The Cognitive Model of Media Choice*. Discussions and elaborations upon these two theories will play a central role when analysing the empirical findings made in our case study. Finally some summarising thoughts will conclude the chapter.
Five basic elements of communication widely recognized as central in communication processes aimed at transferring knowledge are the elements source, recipient, message, channel and context (Szulanski, 2000). These elements are visualized in Figure 5 and in order to highlight that we foremost will look upon the element of channel that box has been coloured. However, in order to explore the element of channel we will to some extent include the other elements in our discussions.

A study made of Sarker et al (2005) focuses on the source in this model and examines how source characteristics affect knowledge transfer. The prerequisites were that electronic media such as e-mail, discussion forums and online chats were the communication channels used and that the receiver of the knowledge was remotely located compared to the source. They found that volume of communication, the credibility of the source and the cultural values held affected the knowledge transfer in a significant way. (Sarker et al, 2005) Szulanski (2000) further argues that the event of knowledge transfer is depending on the dispositions and abilities of the source and recipient. The dispositions include motivation, and lack of motivation of the receiver can therefore make knowledge transfer harder.

We now turn to a more in-depth discussion on the element of channel. As noted in the background, communication in organisations and thereby in projects today possess a wide variety of tools that can be used for communication. Sapsed et al (2005) stresses that the difference in which channel to use plays an important part when transferring information and knowledge. Further on, he indicates that electronic communication channels such as e-mail are more suited to transfer information than knowledge. Dretske (1981) also emphasizes the importance of distinguishing between the source of the

Figure 5 - Conceptual framework for understanding knowledge transfer
(Sarker et al, 2005:203 based on Szulanski, 2000)
information and the channel through which it is communicated. If the sender wants to get the message to the receiver its original form the channel should be neutral, but he states that a neutral communication channel is not possible. Based on this it is an interesting question how the communication channel affects the communication process and the outcome of it.

**Communication Channels**
The last decades has brought new possibilities for information and knowledge transfer by e-mail, databases and the Internet. When these tools were new many believed that geographic distance would no longer be an issue for information and knowledge spreading and sharing. However, this prediction has been proven wrong as human beings still rely heavily on personal informal contacts in their work. (Brown and Duguid 1998; Sapsed et al 2005) Bresnen et al (2003) highlighted that the use of IT and formal procedures for managing knowledge in projects are highly influenced by behavioural factors. Their study showed that project members rather went to a person to whom they were connected to by informal social networks, either by e-mail or in person, to gather new knowledge than searching in a database. The conclusion that Bresnen et al (2003) draws is that social and behavioural processes are more important than IT tools when it comes to knowledge processes. The main finding from their case is that the transfer of knowledge and learning is relying on social processes in a way that is supporting the value of a having a community-based approach, thereby stressing the importance of tacit knowledge and the limitations of codifying it. (Bresnen et al, 2003)

Brown and Duguid (1998) stresses the importance of recognizing that technology only move knowledge in the way that suits the social context and that many of the new technical devices are directed to individual explicit knowledge rather than the tacit collective knowledge. Further, the winning technological devices are the ones that are successfully embedded in the communities and that suits the context. A conclusion made by Brown and Duguid (1998) is that the dialectical thinking in terms of both/and rather than either/or is valuable in viewing the role of technology in organisations. This implies that it must not be one thing that is the most important but that many things can be equally important. Brown and Duguid (1998) proposes that the technology should be supporting the informal, as the degree of formality often is what distinguishes within communities communication from the communication between communities, and that a technology that is too formal can disturb the informal networks that are so important for
knowledge spreading. The reach and reciprocity is another important feature of the technology and the possibility for interaction is crucial. An example of the importance of reach and reciprocity is that e-mail, as simple as it is, still accounts for the major part of internet traffic. (Brown and Duguid, 2000)

We will now present a brief historical overview on the communication channel field and then move on to look deeper into some of the latest findings. First we want to state that a communication channel can be for example face-to-face interaction, e-mail, letters, telephone, video conferencing, billboards or intranets, consequently any mean by which information can be transferred between a source and a recipient. Moreover we want to make clear that the theories presented in this study commonly use the word media to describe communication channel. We will throughout the study use the words media and channel as synonyms.

The history of communication channel theories is dated back to the theory of social presence, proposed by Short et al 1976. The social presence theory argues that the important feature of a communication channel is how well it can transfer the sender’s characteristics and how aware the receiver is of the sender. This has the implication that face-to-face has a higher social presence than all other channels. The outcome is according to the social presence theory best when the social presence is matched to the task. (Robert & Dennis, 2005; Kock, 2004)

Influenced by the social presence theory, Daft and Lengel, 1986 and Daft et al, 1987 proposed the media richness theory. This theory holds the assumption that firms process information in order to reduce uncertainty and equivocality (meaning discussion ambiguity). In the media richness theory the face-to-face media is considered the richest and text-based media as letters is at the other end of the scale. The theory further propose that tasks high in equivocality, for example tasks that demands a high level of knowledge and involves competences from different knowledge areas, is most effectively solved when using rich media such as face-to-face interaction. Consequently, when those equivocal tasks are forced to be performed through media lower in richness the outcome will be of less quality. According to the media richness theory matching of media with the right richness to the right tasks is helping in this aim for reducing uncertainty. (Kock, 2004) The media richness theory has got mixed results when tested in empirical studies. The criticism posed is that the media richness theory does not
consider situational factors, for example geographical distribution, or social factors as for example the manager’s influence that can affect the behaviour of media choice. (Kock, 2004; Robert & Dennis, 2005) It has also been criticized by Kock (2004) for not being properly evidenced. An illustration of social presence in different media classified by the two dimensions spatial and temporal is presented in Figure 6. The spatial dimension refers to when sender and receiver are geographically co-located or distributed. The other dimension, the temporal, refers to whether communication is conducted synchronous or asynchronous.

![Media Classification Diagram](Robert & Dennis 2005:13)

As discussed above, the media richness theory proposes that media high in social presence is more effective when solving tasks high in equivocality and complexity. Further on, the theory implies that the task outcome is better when matching the right media to the right task. Now we will turn to describe theories with a different view on the choice of communication channel.

**Media Naturalness**

So far the communication channel theories revised have been indicating that a certain task is always better performed through a certain channel. However, as reality is seldom that easy explained we turned to newer research to find a more nuanced picture of the field. Kock (2004; 2005) proposes the media naturalness theory as a response to the critique of the media richness theory. Different from the media richness and social
presence theories the media naturalness theory does not state that a specific channel is better for a specific task but instead that different media has different effects. Kock (2004; 2005) is using the Darwinist evolutionary perspective as a starting point to explain the failures of empirical support for the media richness theory, thereby answering his own critique that the media richness theory is not based on a solid ground. Darwin’s theory of evolution proposes that human species evolved through variation, selection and retention at a slow pace throughout thousands of years. This slow development has lead to cognitive, physical and behavioural dispositions of the human race. When it comes to communication Darwin’s evolutionary theory suggests that during 99% of the human race’s evolutionary cycle we have relied upon co-located and synchronous forms of communication involving facial expressions, body language and sounds. Since our biological apparatus clearly is designed for these characteristics, Kock (2005) proposes the concept of media naturalness. The media naturalness then refers to a communication channel’s ability to support co-located, synchronous communication that involves facial expressions, body language and speech which implies that face-to-face is the most natural communication and thereby has the highest media naturalness. To sum up, the naturalness of a media is determined by five elements; location, synchronicity, ability to express and observe facial expressions and body language and also the ability to express and listen to speech.

The effects that different media has on communication is summarised in the media naturalness proposition:

“Other things being equal, a decrease in the degree of naturalness of a communication medium leads to the following effects in connection with a communication interaction: (1) an increase in cognitive effort, (2) an increase in communication ambiguity and (3) a decrease in physiological arousal.”

(Kock, 2005:124)

We have summarised Kocks (2004; 2005) theory in Figure 7, but chosen to present it after having described its content in wording. We start with the three effects that Kock (2004; 2005) suggests is affected when the naturalness of a medium changes:

1. Cognitive effort – The cognitive effort refers to the level of mental activity in the brain. This can be physiological measured by using magnetic resonance imaging. It can
also be measured by how the individuals perceive the effort coupled to the communication. A high cognitive effort is perceived as harder than a low cognitive effort from an individual perspective.

2. Communication ambiguity – Every human being has an individual cognitive schema that builds on earlier experiences. This schema directs how information is processed in the brain and we use it to interpret received information. We also use other stimuli when interpreting a communicated message, including contextual cues, immediate feedback and vocal intonations. An example of this is that a soft intonation can make criticism milder than if it is presented in a media with lower naturalness that does not aloud intonation, for example e-mail. If these stimulus are low or missing, in other words if the media naturalness is low, we will to a higher degree rely upon our individual cognitive schema to make an interpretation. Since all people have unique cognitive schemas this leads to high communication ambiguity, meaning risk for misinterpretations if the stimuli are not there to give the directions needed for interpretation of a message.

3. Physiological arousal – The physiological arousal is shown to be higher when the media naturalness is higher, all other things equal (including for example the topic and the other person). High media naturalness gives raised physiological arousal and can heighten motivation, and vice versa, low media naturalness can make communication dull. However, low physiological arousal can also make communication more focused on the task at hand rather than the relational aspect of the communication.

However, the relation between the decreased naturalness and the effects described above can be moderated by compensatory adaptation. The compensatory adaptation can be achieved in three ways; cognitive adaptation, schema alignment and better thought out messages, which are all described below:

Cognitive adaptation – This refers to the fact that by using a channel often an individual’s brain will develop circuits that supports the use of that channel, making the cognitive effort for using that channel lower. Consequently, sending an e-mail when one has never done it before is harder than when one has been sending e-mails for years.
Schema alignment – People have unique cognitive schemas, but when having cooperated before the schemas has the possibility to become more aligned since the cognitive schemas are built upon previous experiences. This implies that the communication ambiguity described above becomes less when there is a higher degree of schema alignment between sender and recipient. Cognitive schemas can also be more aligned due to previous experiences even when having not met, for example when people are having similar cultural and educational backgrounds.

Better thought out messages – The communication ambiguity can also be reduced when communicating better thought out and formulated messages. For example, when writing one has the opportunity to reflect upon the arguments more thoroughly why the possibility to formulate better thought out messages arguably increases when writing them down.

Finally though, compensatory adaptation can not, according to Kock (2005) fully replace the decrease of naturalness but only moderate the effects of this decrease. The cause-effect relationship of the decreases and increases in the media naturalness hypothesis is thus still valid. The above arguments presented by Kock (2004; 2005) is summarised and presented in Figure 7.

Figure 7 - The Media Naturalness Theory
(own model based on Kock, 2004; 2005)
Furthermore, Kock have performed studies showing that even though work groups perceive e-mail as a poor communication media, most groups voluntarily chose e-mail to communicate because of advantages as the distribution and asynchronicity (Kock, 2005). Many of the groups using e-mail got a better task outcome than the ones using face-to-face interaction. Here the explanation given by Kock (2005) is that the high risk of communication ambiguity was compensated by better thought out contributions. Kock further claims that the media naturalness hypothesis gives a basis of understanding media choice as interplay of biological, social and environmental influences. Kock (2005) concludes that further research is needed for example when considering the social influences on communication behaviour. He also means that managers can use the findings presented here to better target their investments in communication technologies.

The Cognitive Model of Media Choice
Another theory to explain why the media naturalness gets mixed results in empirical studies is brought forward by Robert and Dennis (2005) who contributes with a cognitive view of the choice of communication channel. They recognize that human beings have a tendency to simplify complex massages due to the bounded cognitive capacity usually referred to as the bounded rationality of the human brain. When doing this they argue that social presence can be a distraction from the actual message. They use the Elaboration Likelihood Model, ELM, developed by Cacioppo and Petty as a starting point in exploring this paradox that might be embedded in rich media. ELM is a cognition process model proposing that in order to affect someone’s attitude and understanding the receiver have to be both motivated to think about the message and possess the ability to process it.

The ability to process is according to ELM referring to the cognitive effort the receiver devotes to the message. When the receiver is motivated to think about the message and has the ability to process the message, the elaboration likelihood is said to be high and persuasion is done through the central route in the brain. This means that the individual draws upon existing knowledge and memories about the subject and fully explore the message with the help and associations from prior experiences. This leads to an overall attitude to, and/or evaluation of, the message. The elaboration likelihood can decrease if for example the individual simultaneously is engaged in a distracting task, is without
prior knowledge in the area or if they just by their nature tend to avoid effortful thinking. (Cacioppo & Petty, 1984)

When elaboration likelihood is low, the processing is done through the peripheral route in the brain, and the recipient will either not care about the message at all or devote cognitive effort to other tasks when presented with the message. This gives the effect that decisions based on the message will not be based on careful consideration of issue-relevant information but rather prejudices, positive and negative cues associated with for example the subject or the source. An important point is that the central and persuasive routes is not each other mutually exclusive but rather as representing different positions on a scale from low to high elaboration. (Cacioppo & Petty, 1984)

A central assumption in the cognitive model of media choice by Robert and Dennis (2005) is that if an individual does not fully consider the information in a message, meaning process the information through the central route in the brain, the decision based on this information will not be qualitative. If the motivation to process the message is high and the individual has ability to process the message the individual will consider the information and process it through the central route in the brain. Through this process the individual’s unique cognitive structure will determine if, and in that case how much, the information will change the individual’s opinion. If, on the contrary, motivation or/and ability is missing, the information will be processed through the peripheral route of the brain and the possible change of mind will thereby be determined by prior experiences, prejudices, the number of arguments and the way it is conveyed. This is the result of the fact that the individual is receiving more peripheral signals that give a shortcut to a decision and the information is not thoroughly mediated. The theory implicates that changes in understandings derived through the peripheral route will be more inconsistent than, and not as stable as, a change in understanding derived from processing in the central route of the brain.

Robert and Dennis (2005) start with exploring the motivational factor, and closely related to this is the attention of the individual. They note that:

“Communication is not only an exchange of information but also an exchange of attention, and different media present different usage costs to the receiver”

(Robert and Dennis, 2005:13)
They continue with the notion that a media higher in social presence, for example face-to-face, is demanding more attention than a media low in social presence, for example e-mail. An e-mail can receive as much attention as a message communicated face-to-face, but the sender can not be sure of this. When a receiver agrees to use a media higher in social presence he or she also agrees to pay a higher attention cost. A message low in social presence has to compete with other messages to get the attention of the receiver. (Robert and Dennis, 2005)

The ability to process is by Robert and Dennis (2005) defined as follows:

“The ability to process is impacted by factors such as the intelligence to follow the argument, whether there are enough sources of information to fully grasp the issue being discussed, and whether there is enough time to process and/or reprocess the message.”

(Robert and Dennis, 2005:15)

When coupled to the media choice Robert and Dennis (2005) elaborates and find that low social presence media allows for more time to process and reprocess the message, whereas high social presence media often by convention do not allow for thoughtful consideration since this can interrupt conversations and take up other people’s time.

Further, this also have a connection to the complexity of the message as complex messages includes more information and therefore can demand more time, including more information and the arguments can be harder to follow. Therefore, complex messages can be hard to elaborate on through the central route in the brain when presented through a high social presence media. If individuals are presented with a complex message through a high social presence media there is a risk that they will not elaborate upon the message but rather look for peripheral cues.

This is giving us a paradox in the social presence and media richness theories, meaning when communicating there is a trade-off between the motivation of the recipient and the receivers’ ability to process the message, at least when it comes to complicated messages. The opposite is valid for simple intuitive messages, that they can easily be
presented with high social presence media in order to make an elaboration in the central route of the brain. This paradox is illustrated in Figure 8.

![Figure 8 - Inverse relationship between motivation and ability to process](Robert & Dennis, 2005:16)

Robert and Dennis (2005) conclude with the belief that the best way of handling this trade-off paradox is to switch between low and high social presence media. Meaning that since both the motivation and ability of the receiver is important the sender has to use high social presence media in order to get the motivation and low social presence media in order to get the ability of the recipient. Further they stress that an implication for managers are that they should not present complicated messages, demanding high ability, in high social presence media and they should not seek to increase individuals motivation by using low social presence media.

**Summarising Thoughts**

In this chapter we first presented a general background to communication and some perspectives on technology’s role as a transferor of information and knowledge. Then we moved on to the field of communication channel theories and after a short historic overview we presented two recently developed theories on media choice, media naturalness (Kock, 2004; 2005) and the cognitive model of media choice (Robert and Dennis, 2005). These two theories will form the base for the analysis of the empirical findings made in our case study why we now recapture them once more.
The media naturalness theory proposed by Kock (2004; 2005) proposes that media different in naturalness will have different effects on communication ambiguity, cognitive effort and physical arousal. These effects can be moderated by compensatory adaptation in the form of cognitive adaptation, schema alignment and better thought out messages, however the compensation does not make up for the decrease in naturalness.

Robert and Dennis (2005) proposes a cognitive model of media choice which is concluded in the paradox that social rich media is good for gaining motivation but worse at offering ability to process a message as was showed in Figure 8. This has implications especially for complex messages which should not, in Robert and Dennis view, be communicated through high social presence media. The cognitive model of media choice is thus opposing the hypothesis put forward by the media richness theory which proposes that communication concerning complex knowledge-intense tasks should be conducted through a high social presence media in order to get the most qualitative outcome. This is summed up below:

<table>
<thead>
<tr>
<th>Media Richness Theory:</th>
<th>High complexity – Use high social presence media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Model of Media Choice:</td>
<td>High complexity – Use low social presence media</td>
</tr>
</tbody>
</table>

*Figure 9 - The contradiction between the Media Richness Theory and the Cognitive Model of Media Choice*  
(own figure)

The media naturalness theory do not explicitly state if complex tasks should be done through the use of high or low social presence media, only that high naturalness gives decreased cognitive effort, decreased communication ambiguity and increased physical arousal. However, Kock has in experiments shown that that groups communicating by lower social presence media nonetheless can reach higher outcomes when solving problems than groups communicating face-to-face, but the theory in itself do not imply that it always is one way or another.

Robert and Dennis (2005) make the conclusion that mixed media, meaning both high and low social presence media, should be used so that the receiver will get both motivation and ability to process the message.
The concept of cognitive effort is touched upon in the two main theories and we will now discuss this and relate the two theories to each other. Kock (2004; 2005) discusses it in the perspective that higher cognitive effort is an effect of a decrease in naturalness. This leads to the fact that a recipient has to put in a larger effort since the channel is further away from his/hers evolutionary designed communication apparatus. Therefore the receiver perceives the decoding of a message as harder than if it had been communicated through a more natural media. However, the studies made by Kock showing that groups communicating by lower social presence media can reach higher outcomes when solving problems than groups communicating face-to-face could imply that the extra effort that has to be put in when using low social presence media can be beneficial. (Kock, 2005)

Robert and Dennis (2005) do not themselves put forward the notion of cognitive effort, but the underlying model, ELM, is referring to ability as the cognitive effort the receiver devotes to a message. Robert and Dennis (2005) instead refer to the ability to process a message as depending on various variables as time and enough information and intelligence. If we couple these together the cognitive effort can be seen as depending upon time, the amount of information and the intelligence to follow the arguments.

Here we see a connection between the two theories, in the sense that the increased cognitive effort coupled to decreased naturalness in the terms of Kock (2004; 2005) sometimes can result in a better task outcome than if the cognitive effort is lower as in higher social presence media. The increased ability inherent in lower social presence media that is put forward by Robert and Dennis (2005) is suggesting the same thing but for another reason. Or is it really? Both of the theories are sprung out of a critique of the media richness theory and it seems that their different explanations to why the media richness theory fails are approaching each other at this point.

We will later on in the analysis return to the media choice theories and test how the theories withstand the empirical findings. Now that we have presented our frame of reference it is time to let the reader follow us on a tour to Lund. In the Empirical Findings, section IV, we will present the reality that the frame of reference aims at decoding, namely the Converting Standard Line Project – TBA and the TPCA organisation.
IV EMPIRICAL FINDINGS

In this chapter we will present the empirical findings made during this study. The data material is based on interviews and observations made at Tetra Pak Carton Ambient in Lund during February and March 2006. Interviews have been conducted with the project manager and project members of the Converting Standard Line- TBA project and with representatives from the management team of TPCA.

Introduction

In this chapter we aim at presenting the essence of the empirical data gathering that has been retrieved through formal and informal interviews conducted over a period of two months and observations made during our stay at Tetra Pak, Lund. The aim when collecting the empirical data has not been to fully comprehend the technological production processes but rather the organisational processes within the project that aims to improve and upgrade the technological process. The disposition of this section structure follows the overall structure of the study and is divided in three chapters. The data material will be presented together in an interwoven manner where quotations from the formal interviews will be blended with observations made at site, this in order to create a rich and vivid presentation of the material. Furthermore it shall be noted that quotations will be used extensively in order to make a valid and accurate reproduction of individual’s opinions on what it is like to work in a major industrial project within Tetra Pak. The quotes are chosen to give a representative and concluding picture of the project members view. Before starting the presentation of the data material we will start off by presenting how this study began, with a train ride from Linköping to Tetra Pak’s facilities in Lund.

A Journey South

We arrive at Lund Central Station one gloomy February morning and our travel into Tetra Pak begin with a taxi ride. The enthusiastic taxi driver lays out the general picture of Tetra Pak and tells us that they are great for the local taxi industry, especially the numerous long drives back and forth from Kastrup International Airport. After a few minutes we enter Tetra Paks compound where buildings made out of brown bricks spreads out over a vast area; the feeling of industry is present. Once inside we are greeted welcome and escorted through winding
corridors to the domains of Tetra Pak Carton Ambient (TPCA), the part of Tetra Pak where technology is invented, improved and industrialised. We pass by several small conference rooms with names like Nobel, Newton and Einstein and the glass walls reveals small congregations of people discussing graphs and data displayed on screens. The atmosphere feels calm but focused as we make ourselves comfortable in one of these rooms, waiting for two representatives from the management team of TPCA to arrive. The open door is facing an open office area and we can hear small conversations taking place. English is mixed with that fine Swedish dialect, so characteristic for the southern parts of Sweden. The management representatives arrives and it soon becomes clear that we all share in interest in seeking to understand and improve project communication. The rest of the meeting keeps adding to our picture of Tetra Pak as a Swedish company, embedded in the culture of southern Sweden, but still so close to Kastrup International Airport and the global scene. The entrepreneurial history and desire for engineering excellence is constantly present and we leave the meeting uplifted and convinced that this is going to be an interesting spring.

Picture 1 - Tetra Pak main entrance
(own picture)
1. Watching a Project-Based Organisation

In the first part of the empirical findings we will present the background needed for putting the interviews and observations in the right context. We will start with a general presentation of Tetra Pak and then move on to a present our case study object, the Converting Standard Line-TBA project (CSL project). The chapter is based on material supplied by Tetra Pak as well as on interviews and observations.

Tetra Pak

“A package should save more than it costs”

(Dr. Ruben Rausing, Founder of Tetra Pak)

The world consumption of water, milk, juice and other liquid foods equals 14 billion litres a day and Tetra Pak supplies this huge market with no less than 110 800 million packages, totalling net sales of 7 525 million euros (2004 figures). Tetra Pak aims at producing packages that protects both the nutritional value and the taste of the packed product, a concept captured in the company slogan - protects what’s good™. Tetra Pak is today present in 165 countries and employs 20 905 people around the world. (Tetra Pak internal material)

It all began in 1929 when Ruben Rausing and his companion Erik Åkerlund founded the first Swedish factory specialized in packaging under the name Åkerlund & Rausing. The firm became one of the leading European packaging manufacturers and the first step towards the development of a carton for milk took place. In 1951 AB Tetra Pak is founded and in 1952 the first tetrahedron-shaped carton, filled with cream, hit the market. Development then continued in a fast phase, more shapes and sizes were added, the production technology was constantly improved and the Tetra Pak packages became a beloved item found in every Swedish household, a fact even more true today, but now in more than 165 countries all around the world. (Tetra Pak internal material)
The Process of Producing Packages
Tetra Pak’s main customers are dairies and producers of juice and other drinks worldwide. Tetra Pak delivers both the packing material and the filling machines to these customers. The thirty-eight converting factories, spread around the world, are producing packaging material in huge rolls, a process that the CSL project aims at improving. In order to understand the process and the project better, we spent one interesting afternoon in Tetra Pak’s converting factory in Lund, guided by one of the project members. In the huge production halls it slowly became clear to us what Tetra Pak is all about and what the purpose of the CSL project is. This is a recapturing of that afternoon:

Dressed in white coats and chic red caps, like students on a field trip or visitors from abroad, we enter the first hall of production. A sense of cleanliness and order hits us as we make our way forward on the marked path towards the first machine. Workers in blue overalls, surprisingly few, are standing next to a couple of screens that monitors the prepress and printing process, the first part where the carton is printed and the folding guidelines are pressed. Large rolls of carton are waiting in the corner to be picked up by the driverless automatic trucks, and to be transported over to the printing machine. After having avoided being ran over by one of these animals, (which we later was told is impossible due to sensors) we continue in to the next hall where two three meters high and about 35 meters long laminators is running in full speed. A large roll is spinning at each side of the machine, one with only printed carton and one where thin layers of plastic and aluminium foil has been added. Above them hovers two more, waiting to be attached as soon as the other one has reached its end, all is done in full speed. Once more the “living” trucks pick up the rolls and silently sweep them over to the next hall, for slitting and doctoring. In this part the large rolls which consist of four to eight rows of carton packages are cut up in single row rolls that are transported out to the filling machines in the dairies. In order to increase the overall equipment efficiency, largely depending on the speed in which the material passes through the machines, the process is not stopped for minor misfabrications, why a few rolls also has to pass through doctoring. In the doctoring process the meters of damaged fabrications are cut out from the roll, making the rest of the roll perfectly good to use. This is done to guarantee the customers absolute top quality and making sure that they do not have to stop their filling machines in production. After several hours of questions and explanations from our guide, himself an expert within the lamination process and member of the CSL project, we have reached the end of the production line. Large rolls of milk and juice packages are being wrapped in plastics and ready to be shipped to dairy’s and juice producers all over the world, ready to shoulder their responsibilities of protecting what’s good.
Converting Standard Line –TBA
The CSL project is initiated in order to create a standard line of production for Tetra Pak’s converting factories worldwide. This standard line is concluded in specifications concerning both equipment and process, meaning both what equipment that should be used and how the production process should function. The motives behind the CSL project are based on the strategic decision of increased standardisation in order to lower the future development and productions costs. The goal is to produce a more standardised output that fulfils the demands of Tetra Pak’s global customers and to reap the benefits of increased organisational learning and coordination possibilities between the different converting factories around the world. Up until now the 38 Tetra Pak converting factories have been relatively free to operate independently in order to strengthen incentives and local adaptation, a strategy described through the Tetra Pak mantra, “Freedom within Accountability”. However, this freedom has also brought with it dissimilarities in both equipment and process specifications. These are now viewed as an obstacle for global deployment of new innovations, process improvements and cost savings due to scale in operations, both in the development phase and in production. Two of the project members summons the ongoing process like this7:

“Standardisation is important, a giant leap for Tetra Pak, it’s important not to mess it up.”

“It’s a heavy task introducing standards, and to make people use it.”

Project Objectives
The formal objectives of the CSL project as stated in the Project Requirement Document (Tetra Pak internal material) and distributed by the project manager are the following:

1) To contribute to CTC (Converting Transformation Cost) reduction by
   a. Reducing paperboard trim by $n$ mm
   b. Reducing waste and increasing OEE (Overall equipment Efficiency) aligned with global deployment

2) To reach a capability (Cpk) > $n$ on critical packaging material characteristics and on critical converting process parameters

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7 The quotations in this chapter have been translated from Swedish to English by the authors
These objectives all have fixed numerical target values, but for reasons of confidentiality and since they add no explanation value they have been left out of the study and replaced by $n$. The objectives can in general wording be understood, and was during the interviews and our stay at Tetra Pak referred to, as follows:

- Deliver a validated standardised process and equipment specification
- Decrease waste material in production
- Decrease claims from customers
- Increase the Overall Equipment Efficiency, OEE

**Project Team**
The project team was put together by the project manager in collaboration with the line managers in order to acquire the needed competence from different knowledge areas. This process was based on a mixture of formal and informal proceedings. The project manager asked the line managers for time from a certain competence area, and sometimes also for specific persons. Time allocation, articulated in percentage, was then reached through negotiation. At the same time informal contacts were made with the individuals to check whether they were keen on participating in the project. Interesting to note on this matter is that Tetra Pak seems to be a company were people stay for quite a long time. Some project members had worked for between one to six years, but most of the members had worked for between 17 and 30 years. The Tetra Pak experience present at the CSL project kick-off measured in years totalled just below 300\(^8\). Many stated though that they had moved around within Tetra Pak and many had spent several years working abroad. Many of the members had worked together in previous projects and knew each other fairly well; others stated that they did not know the other members that well and if they did there were normally a clear linkage to working group and knowledge area.

**Project Organisation**
The project organisation is based on a matrix charter, containing four different subprojects and five different cross going support functions and activities, see Figure 10. The interviews were selected and planned in collaboration with the project manager in order make sure that all parts of the project were represented.

\(^8\) 17 project members participated at the kick-off
**Project Members and Their Time**

All members have a percentage in the project, ranging from 5-10 percent for some support functions to between 30-70 percent for other members. The percentages are based on annual figures and do not take the variation of workload into consideration, this meant that members were sometimes scheduled for more than 100 percent.

The project members also participate in other projects, normally 2-3 projects in total. In addition many are also engaged in smaller activities for example when things go wrong in one of the factories. These extra activities can become just as time consuming as the project work and was considered as a bit of a problem since they were not usually
included in the time plan, but they did still steal a lot of time. One of the project members put it like this:

“I participate in two other projects as well and many small activities that takes two hours here and two hours there, sometimes a whole day, and that becomes many hours in total when you add them up at the end of the month”

Another aspect mentioned was that projects rarely end even when they officially are completed; factories and other stakeholders tend to come back with additional questions and to make clarifications. This was considered to be in order, but still troubling since time for these activities were not allocated in the individuals’ time plan. The discussion of time and how the project members deal with the lack of it will be further described in the chapter on Individual Time Consumption.

**Project Kick-off**
We participated at a two day project kick-off planned by the project manager in collaboration with two consultants from Liera AB. The kick-off was held in Klippan, just 50 minutes north of Lund, and was an interesting and instructive display of how to work with teams to create team spirit and coherence of objectives, roles and tasks. The main purpose of the kick-off was to make everyone see and agree on the same objectives and to bridge the different parts of the project. The kick-off was viewed as helpful for achieving this and was often referred to during interviews. After the kick-off a common symbol for the importance of shared goals was the picture presented below, in Picture 2. When one cannot see the picture there is frustration and irritation, but once you see the motive it is hard not to see it clearly. This symbol for the importance of shared goals was also a reoccurring subject in the interviews conducted after the kick-off. The picture is blurry, and the quality seems to be bad but in this case it is in order, it is supposed to look that way. Can you see what it is?
2. Watching Knowledge at Work

We will now turn to describe the daily work in the CSL project. This will include a presentation of the different parts of the project and what these parts need to cooperate and communicate about. This is done based on our strong belief that without an understanding of the context and purpose surrounding the studied phenomena of communication, valid results can hardly be made. Our view on communication is supported by two of the project members stating the following on the topic of communication:

“Communication is not for its own sake but for achieving certain ends”

“It’s about the project definition and the need for cooperation. You can not cooperate without a clear need. There has to be a clear need and purpose for cooperation.”

The disposition of this part is as follows: First we will look at tasks, roles and knowledge areas within the project and how these cooperate with each other. This part
will also include two chapters about how problems get their solution and how individuals in the project view their time consumption. We will then move on to present the project members views on communication and cooperation towards outside stakeholders. The key outside stakeholders in the project was identified by the project members as the TPCA organisation, the test factories, the value segment and the suppliers. These stakeholders will be presented individually and the chapter will then be closed with a presentation of the project members’ general views of factors that supports and hinders cooperation.

Roles and Tasks

The roles in the project were to a large extent derived from the different parts of the production and to the knowledge areas attached to that part. All of the project members had some kind of specialist area, but many were also responsible for coordination activities. This implied that specialists to some extent also needed to be generalists, a situation not celebrated by all members. It was clear that some members rather wanted to focus more intensely on the technical issues than dealing with coordination and administrative tasks. Some members did however like the widened view that came when taking on those kinds of tasks. In general though it was stated that more and more time was consumed by doing administrative tasks, regardless of level, and that the division between specialist and generalist was being harder and harder to see. It was a general notion amongst the project members that clear roles were an important factor for cooperation.

“The physical arrangements makes it easier, but also that you have clear roles so that you don’t have to waste time positioning yourself once the project has started.”

The tasks performed were of a widespread art, ranging from data gathering and analysis to individual and group based problem solving. Communication and coordination of activities and tests with parts outside the project were also an essential part of many project members every day work. In addition a lot of time was said to be spent travelling and visiting factories and suppliers. A large portion of the time was also said to be spent on meetings and e-mailing, which some project members considered a natural part of the job and others viewed it as an obstacle for focusing on the technical solutions. This is a quote on the matter:
“What have I done today? Nothing, I have just been mailing and sitting in meetings, but perhaps that is my role, I am not the one producing and printing packages.”

The large number and varying characteristics of the tasks performed by the project members did rather quickly catch our attention, and a considerable amount of time was spent just discussing what an ordinary day looked like and how much time was spent doing different tasks. Below are some statements made during these discussions:

“"My time is divided fifty-fifty between problem solving and coordination, or perhaps a bit more coordination, say sixty-forty. And there is a bit too much administration; it takes up a lot of time.”

“All of it in an awful mixture”

Cooperation within the CSL-Project
The CSL project members all have general knowledge and understanding of the processes, but are specialized in some part. The main areas in the CSL project are base material, prepress and printing, material treatment, lamination and slitting and doctoring. In Figure 11 we present our schematic picture of these different subprojects, which each has their own sub-project leader (SPL). These processes are then followed by “downstream” activities which also includes the filling machines at the dairy’s. However the part prepress and printing was taken out of the project just before the kick-off, since those competences were needed urgently in another project.

A lot of the discussions in the interviews circled around knowledge areas and the level of specialized knowledge in the project. Below is an enlightening quote on what its like to work with people whose knowledge is highly specialized.

“The risk with people who knows too much is that you can’t get any answers from them. Meaning, if you are to decide something and want some answers, how do we do with this? Can this affect? They say that of course it affects, everything affects and then the discussion starts and you can’t move further. We have these
discussions sometimes. The more specialized the harder it is to widen the discussion. “

![Diagram showing project management and subprojects](image)

Figure 11 - CSL Project - Cross functions and Subprojects
(own figure)

The general notion of the project members was however that cooperation was not considered hard within the project and that everyone were willing to help and contribute when asked. Most cooperation was conducted one step up or down in the process, and then knowledge was not considered an obstacle. Even though they stated that they did not know and understand all of what was being done in the different subprojects they knew enough to cooperate and to understand each other once there was time for proper presentation of it. Moreover, they felt that a lack of time and the availability of people, rather than knowledge differences, were the hindering factor for actually improving cooperation capabilities in the project.

“For me it takes longer time, because people are so occupied working with other problems. This is a problem, in the factories it’s easy to plan but here everyone is travelling all the time. They want to help and as soon as you sit together they are open and free to help. People availability is really a problem.”

“The feeling of sharing and a joint ownership of a problem would have been greater with a more shared process, more efficient. It would have been good to do
one activity concentrated for one week. Less amounts of heads in the projects, but more allocated time would also be good, so that you can build a hardworking tight group.”

“Fewer projects do not have to imply that we do less, rather the contrary”

It was however stated by one the members that structure rather than time was the hindering factor:

“The problem with the structure is how we are to reach the objectives. Not really the time but rather what’s my responsibility and where do I have the facilities for feedback and discussion. Very hard to enter a meeting and make a commitment if you are not concentrated, you say ok that’s good, but really you have not thought it over. Then it’s not certain that the outcome has the right quality, especially since many are divided amongst many projects.”

Cooperation between Subprojects
The CSL is divided in three subprojects as shown in Figure 11. The activities and knowledge’s in these sub projects needs to be coordinated in order to reach the project objectives. A common notion was that an overall knowledge about the process is vital for understanding and communicating about different problems.

“The first time I was at the project meeting I did not understand much, but you learn and then you ask. You can not cooperate if you do not understand what the others are doing.”

However, many stated that they had clear picture of the process, whilst admitting that the deeper and more specialised knowledge of other knowledge areas was theirs alone. When asking whether they understood each other in the project we received the following answer from one of the project members:

“We try to at least, otherwise we are lost. But once we get started with our pure core stuffs, then they are lost, and so are we when they get started. Because then you are within your part, and you know that part, but not many other do, and there you have a waterproof sealing, but also it is so narrow that in order to keep
updated you would lose the other part. It’s very hard to get good at both, you can have information and a general awareness about it, but at another level, this we become better and better at this as an organisation, working more comprehensively. That part has been strengthened over the last years, both that you are seated together and that focus is on the projects and that the projects have a wider grip.”

Meetings – the displaying of results and progress of seemed to be of vital importance for team spirit and project success. When asked if the different subprojects worked in a different way, one of the project members said that:

“Not really a problem. Perhaps though that individuals work in a different manner, regardless of group belongings.

The interconnectedness between the different parts of the projects was described by some of the project members as follows:

“I have not even tried to get a grip on the other parts. Would have liked to know more, absolutely, knowledge is always good, but there is no time. I think there would be benefits since its all part of the same process…”

“Sure, it’s all connected, in one way or another. It would be great with more general info, big things; it would be both fun and favourable to have a clearer picture and better understanding of the whole.”

“Spontaneously I feel that everyone is in their own part, and then they feel like now he comes and disturbs, but want to be nice and help, then it becomes disturbing, instead of owning the problems together. If it would have been a continuous process, you would not have to do things two times. Physically we are seated close to each other, it’s an advantage just to turn the chair around and ask each other, make use of the coffee breaks and so on. But it can also be a disturbance. But if you did things together you could have make use of each other and avoided disturbance. Made plans together instead, for example on Friday we shall be finished with this and clearly stated who are going to do it. Then we could have transmitted thoughts and knowledge in a more efficient way instead of
the current way where each one give their opinions after you already spent a lot of time on it. Different knowledge areas can complicate the understanding…. But if we would work more together it would be easier, and we could avoid a situation where everyone sits on their chairs watching over their positions.”

How Problems Get Their Solution

"Problem solving is best face-to-face"

Problems get their solution when sitting down and discussing them face-to-face, that was the common view amongst the project members. These face-to-face interactions were rather informal than formal, and it seemed like a lot of thinking was going on individually between these meetings. Even if a solution is not reached the first time, it will be reached the second or the third time since people take it home and process and revise the possible solutions. Below are some comments made on the topic of problem solving.

“Within the project it’s mostly sitting down and talking, it’s the most efficient way the way I see it. For me it’s a lot about sitting down in one of these rooms. You have all your senses with you in another way; mail is mostly text and sketches and so on. Sometimes I feel like there is a lot of time lost talking around before you find the right forms for how to discuss it, but I think that’s necessary in order to find the right way and to get to know each other and so on.”

“If it's a technological problem that is being discussed, well than you may not have an solution and its hard to concretise what’s been discussed, it may not even be worth it, but everyone knows what its about and goes around pondering about it and then you have a meeting, perhaps two days later, and then you continue the discussion and all of a sudden a solution pops up that feels crystal clear. “

“We do the definitions phase together, and then each person solves their own stuff.“

“I don’t know how much we are to cooperate in the project, but if we are to cooperate more it would be in the definitions phase, to define activities together.”
Some views also concerned the approach of trial and error when trying to fix a problem, instead of sitting down and analyse before acting. There was a notion that time shortage may push a “trial and error behaviour” when a planned analysis approach would actually have been faster.

“Trial and error is the traditional way, and it’s too much of it. Instead of sitting together and saying: ok, this is the problem, let’s do root cause analysis. Perhaps it’s quicker with trial and error if you are right in your first attempt, but not otherwise, plus that it’s harder to standardize and transfer to other sites.”

Problem detection and understanding was considered as vital as the actual solving and coordination, and the process was viewed as a living dynamic process where changes had to be made several times along the way.

“Mostly it’s about understanding, you don’t always know the problems in advance, but rather discover little things that we can fix and solve.”

It was also clear that problem solving was an activity that required the integration of many competences.

“Problem solving is about combination, you can’t make it without the other parts and therefore it is often a combination of at least two or three competences involved.”

**Individual Time Consumption**
Comments were made that the workload was heavy and them all and it became obvious that personal strategies had been developed to cope with the time shortage. When asked whether it was hard to manage the division of time between projects and function, one of the project members answered:

”No. Not when you have been here as long as I have, then you choose a bit. You just keep going until someone screams, then you say that you don’t have any time over, if no one screams you sometimes have to put things aside, you have to in order to survive practically.”
Moreover, the first victim of time shortage was said to be reflection. The need to solve daily problems could sometimes imply that less focus could be spent on the long term effect. Or as discussed in one of the interviews:

“...Long term, as long as it doesn’t affect the short term goals.”

Many stated that the amount of time working alone and undisturbed was not really enough.

“If you were to have thirty percent on your own instead of ten to fifteen percent, then you would have time to plan more than react.”

“I work about fifty percent alone, communication not included in that figure but still, and maximum 50 percent alone. Time without interruption, a maximum of one hour. Never a day”

“In this project, perhaps then 30 percent of the project time alone. About the same in other projects, need to talk to each other in this type of projects, otherwise you can’t make progress. Sure those standard things you can send an e-mail about. And undisrupted time is about thirty percent of the personal time, this since we are seated as we are”.

Cooperation with Stakeholders

When working across the borders of the project cooperation was considered considerably harder, both factory- and supplier knowledge needed to be screened before engaging in any deeper common activities. Cooperation and communication was also considered harder due to cultural differences and differences in interest and logic amongst the stakeholders. Figure 12 introduces the key stakeholders in the CSL project: Test Factories, the TPCA organisation (actually an internal stakeholder, but still outside the borders of the CSL project, and therefore included here), Value Segment and Suppliers. These will now be presented individually.
Cooperation with Test Factories

"We exist only because the factories want our help"

"The factory is not our laboratory, so we have a very short time to do the test. So you should use it in the best way".

These quotes serve as a good starting point for describing the relationship with the factories. The reason why we have chosen to label it test factories are because the every day cooperation was predominantly made with two certain test factories, however the standard line developed by the CSL project is in the long run to be deployed in more than just these two factories. Below are some comments made on what’s important to consider when communicating with the test factories.

“The factories motivation is depending on whether something is attached to their performance figures or not.”
“It’s important to communicate problem as well as success - being transparent and thereby gain trust and credibility.”

It was also stated that it was good to get a personal contact as well, to have met eye to eye. When asked if that made communication easier, one project member answered:

"No, it’s still as hard for me to interpret them. Here sits a Swede who translates to English and then there is for example a Chinese there on the other side who translates English to Chinese to understand it and then writes back in English what he has thought out on Chinese and then I’m sitting here and interpreting that from English to Swedish. Of course there are some problems."

A comment made by one of the members was stating the importance of actually going to the factories and promote the project:

“Communication needs to be improved towards the factories; someone needs to visit the factories. It takes time and money but it is good for the converting factories. I think someone should do this regularly from project, sell the project. I think that would be good both for us and for the factories, good for feedback. Because today there is a competition in solutions, both the project and the factories are working on the same problems, perhaps there is a possibility to help and thereby to save time. “

**Cooperation with the TPCA Organisation**
In order for cooperation to work smoothly towards internal stakeholders it was stated that it was important that the project manager really understands what the orderer wants, and that the members then understand what the project manager wants. Written communication between these different parties were said to decrease the risk for misunderstandings. Below are some comments on the topic:

“To put up realistic goal and to anchor them further up in the organisation, so that everyone understands what we are working with, even those above us. It’s the project manager’s responsibility to draw a clear picture of this. I think our project manager is good at this; I have been in projects that did not work as well as this one. “
When we asked one of the project members what he considered to be important to get from the management we received the following answer:

“Support from above, communication upwards and outwards plus resources both in terms of money and of having availability to the right persons. Time from the individuals and time for test runs in the factories is crucial. If we had more time we could look closer into things that can have an impact, and then perhaps we can get an even more reliable result.”

**Cooperation with the Value Segment**

Value segment is the internal word for the market company, situated in Modena, Italy, that supplies the information and prognostication on what the customers wants. It was articulated that they were the suppliers of the business case. Here are some notions on what’s important when cooperating with the value segment:

“I don't wish to add one more link with no additional value. It will mess up more than add value. It’s hard to get people in the value segment to understand the magnitude of this project. Perhaps due to that there are two different cultures within PMT and value segment. Transparency is important, people know more now.”

“It’s important to know what kind of information that could make sense to give to the segment. The information to the factories and to the segment should not be the same. The segment is generally interested in two things: How cost will evolve and how performance of packaging material will evolve? The factories are more concerned with questions like; how can this project help me to reduce the gap? Even if some communication has been done, more can be done.”

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9 The reducing of gap is referring to the difference between the technical speed stated in the specification and the practical speed actually reached in the factory. This is one of the things that the factories are evaluated on.
Cooperation with Suppliers
When choosing which suppliers to work with, knowledge was singled out as the most important criteria. It was important to make sure that the suppliers really understood what was being asked of them. Below are some illustrating statements.

“Knowledge is no problem within the project; everyone has seen a printing press. It’s harder though towards the suppliers. You don’t choose a supplier that does not understand the problem. We can not take the risk and spend time on educating someone how they should solve the problem, unless they possess some very unique qualities.”

"First I check them up, then a invite them here and feel their level of knowledge, if they get what I mean and what the problem is, you can move on and have additional meetings or contacts and exchange ideas and drawings concerning that equipment details, then it hopefully leads to a test run in the factory."

Factors that Supports Cooperation
In this chapter we will present some key notions on the things articulated by the project members as crucial for cooperation. One notion was for example the importance of having met at least one time before engaging in joint activities. This was expressed as follows by one of the project members:

“It’s very important to have met at least one time – to socialize and to talk of family, marriage, and son’s and so on. It creates a great and important link. Maybe one time is enough, when making a mail you think of the building, the room, the street. I think this is very, very effective.”

Now an array of thoughts and reflections on what’s important for making cooperation work will be presented, this in order to correctly reproduce the variation of thoughts and opinions amongst the project members:

"I believe in the energy that is generated in meetings between people. That energy creates new ideas at new levels. It’s important to create that level of pioneer spirit and it’s in the milieu not the individual.”
“The classical, that sending and receiving works. And that’s about meeting in person, that’s our experience, management sometimes say: do you have to travel? I say that if we are going to have a good and deep collaboration with a supplier it takes that you met regularly because otherwise they do not do what we want them to do. We can not explain everything in text or in sketches but sometimes we need to discuss the matter to find a solution, and sometimes you need to check that a supplier or a customer has understood. You can not make a product if you do not meet the people behind, don’t imagine that!”

"The usual, respect. Keeping to what’s agreed and making deadlines, or at least communicating when not able to make deadline.”

“You have to respect the rules, especially when there is a shortage of time, respect the rules. First set them, and then respect them”

"It's facilitating to have good working tools, computer, phone and so on. I work on distance once a week, it's great, just shield off and do mailing and personal tasks full time. It’s a tendency that we are getting to close to each other, for good and worse. We are sitting close, so you have often had to run into these silent rooms, I mean you have to show respect to the others as well.”

"You have to have fun at work. To talk about other stuffs as well and get to know each other a bit privately as well. Then you can understand if someone is on a bad mood one day, if the kids are taking up much time for example. You have to take some of your leisure time to work, and some of your work to your leisure time. That’s the benefit of working under the device freedom with accountability, but it’s also easy to work too much”

**Factors that Make Cooperation Harder**

Amongst the factors mentioned as hindering for cooperation was: misunderstandings due to cultural and language differences, tight time schedules and availability of people. The availability problem was two folded, derived from both the extensive amount of travelling but also the shortage of experienced people. Furthermore there were some comments made that history and traditional ways of doing things were deeply rooted and sometimes hard to change.
“Not really understand each other, take some of the factories for example – they sometimes say ‘I will fix that’ but then nothing happens. I have now understood that they give that answer automatically.”

"It’s very common that people like me who have worked for a long time, they say - I worked for a long time this way and it works well. Why should I change if it only complicates a lot of things for me”.

“It’s the ordinary thing that you have too much to do, the workload is too big. Then you get ten bad projects instead of two good. And this easily happens when you take on too many things, it’s a problem.”

3. Watching How Individuals Communicate

Given the situational context described in part one and two, we will now turn to presenting the empirical findings made concerning which communication channels the project members used in their every day work for enabling the cooperation, coordination and problem solving activities previously described. The general question of which role communication plays in project work rendered the following answers from two of the members:

“Pretty vital. Without communication we will for sure miss.”

“Absolutely crucial. It doesn’t work without it.”

These channels were mentioned by the interviewees as available for their individual communication:

- E-mail
- Face-to-face
- Phone
- Phone conference
- Netmeeting
Managing Attention Budgets in a Project-Based Organisation
- A Project Communication Framework -

- Video conference
- Project home page
- Intranet

E-mail

"E-mail is like shovelling snow when it is snowing outside"

There were broad consensuses within the project that e-mail was a key tool for communication, a majority ranked it as the second most important communication tool after face-to-face interaction, both within the project and with outside stakeholders. E-mails elevated position above both time and spatial differences was regarded as one of its key strengths; equally important was also the written nature of an e-mail, which was thought to give the communication a kind of contractual formatting. The notion of e-mail will now be presented through a series of quotes:

"Putting it down in wordings feels safer, it’s more clear which agreement you have done... also for my self, I find it easier to formulate my own thoughts when I am writing them."

"E-mail, e-mail, e-mail, e-mail, the benefit is that you always have it with you, you can normally respond everywhere, you can make better use of time, you do not bother others and you have it in writing. The down side is that there is such enormous amount of them, but then again I always have them with me, but still it is a pain, but a pain you have to live with."

"It is e-mail. Only. Very convenient, that’s good. Use e-mail when speaking to all suppliers. Rarely pick up the phone, but good to have for some clarifications. Mail is also great when there are time differences."

"There is a thing with this e-mailing and the mobile phones that’s a bit sick, only because someone sends you a e-mail he’s expecting an answer within five minutes, I haven’t even received the question! And the problem is not solved quicker just because you got it through an e-mail, the only difference is that the deliverance has been faster than with ordinary post, but solving the problem isn’t faster, it still
takes the same time. Same goes with the mobile phone, everybody is to be reached everywhere, but there is an off button as well, even on meetings...”

“And it’s the same home as well, and Saturdays and Sundays and evenings, the mailbox. The Outlook, without it you would have died. Without it work wouldn’t function, it functioned in the old days but I don’t know how. Back then there was fax and phone, we used the phone much more, I have very few phone calls these days.”

"A lot of stuff comes to you through the e-mail, and it is way too easy to put CC, so there is an awful lot of stuff finding its way in there, so... “

"After the holidays – a thousand e-mails, then there is this Ctrl A Delete...”

It was clear that many had developed some kind of strategy to handle the flow of e-mails. The variables for choosing how to sort and prioritize e-mails in the inbox ranged from sender and subject to deadline and emergency needs. It was also stated that experience and gut feeling helped them to prioritize. One project member expressed it like a choice between two strategies; you either do all in a faster speed and at a lower quality, or you do some selected parts perfectly. A general problem though was that even after prioritizing it still was too much left.

Face-to-Face
When discussing with the project members on how face-to-face interactions were conducted it soon became clear that face-to-face interactions were viewed as an invaluable communication channel. The most common ways to discuss face-face interactions was in terms of formal meetings, informal meetings and informal interactions. The findings will now be presented in that order.

Formal Face-to-Face Meetings
Formal face-to-face meetings refer to meetings that are scheduled in advance and have some kind of regularity and planned structure and purpose. The CSL project have two kinds of formal face-to-face meetings, test planning meeting and project meeting.

Test planning meeting: Held every Tuesday in order to plan and coordinate the different tests that the subprojects needed to have carried out in the test factories. The
meeting was lead by the cross functional test planning coordinator. The purpose was to make the most use of the factory machine time allocated to the project and to coordinate the different sub-projects in order to test how changes somewhere in the process affected other parts. This was done by seeking to test the worst case scenario at once to avoid discovering problems after deployment.

**Project Meeting:** Held every Friday with the core team members, led by the project manager. The purpose is to see and display how the different sub-projects are progressing, aspects of time plan, costs and quality are covered. We observed one of these project meetings, and some of our observations are presented below:

The project meeting was conducted in a structured but informal way; everyone within the core team seemed to know each other fairly well. The word was free and small discussions took place, but the character of the meeting was one of consensus and shared picture. However, one discussion between the project manager and one of the sub-project leaders did reflect dissimilarities on whether the timeframe up to the next milestone was realistic or not. The manager agreed that it was tight but emphasized that if they could not make that milestone the whole project will be delayed one year, since the deliverables for that particular milestone had a severe cost affect and needed to be included in the factories budgets for next year or they would be put on hold.

The sub-project leader replied that: - "*The economists can not be allowed to rule over the technology*"

This statement was commented by one of the other sub-project leaders: - "*It doesn’t seem like the technology can rule over the economists either*"

The discussion then moved on and circled around the importance of not deploying anything that hadn’t been fully tested and validated, a view shared by them all but perhaps best phrased by one of the sub-project leaders: “*We have to be very cautious so that we do not spread viruses.*”

Our interpretation was that he wanted to imply that regardless of time frames and delimitations of the project, the specifications and process improvements that are to be
introduced into the production process needs to be validated or the project will not only be a failure, it will be harmful to production.

**Informal Face-to-Face Meetings & Interactions**
In addition to the formally planned face-to-face meetings, the interviews and observations revealed that the by far largest portion of face-to-face interaction was carried out outside of planned structures. This was generally regarded as the fastest and most accurate communication channel.

"Informal information is always more valuable, no matter how you view it, because then you really find out, ... when things are distributed officially its so filtrated from everything essential once it reaches you, that’s why informal information is usually better.”

Informal face-to-face meetings refer to when two or more project members made arrangements to meet in one of the small conference rooms. Informal interactions refer to small chats and discussions held by the coffee machine and in the open office area. It should here be stated that the architecture of the office was created to support this kind of informal interactions. The drawing in Figure 13 illustrates the open office area in which the majority of the project members were seated.
Explanation Figure 13:

• **PM** – project member.
• **Thick lines** – walls
• **Thin lines** – glass walls
• **Circles with x** – other TPCA employees

This physical arrangement of the work area was perceived as mostly positive, but there were also statements made from several project members that these positive effects did come with some drawbacks, as stated in the quote below:

"Since we are seated together – there is a lot of tapping on the shoulder at the desk, that’s why they have placed us like this, to talk to each other. Good to sit together, fast answers, but also disturbing sometimes, but it’s mostly positive."

However the extensive travelling within the organisation still made it hard to communicate face-to-face.
"If somebody is at their desk you can speak directly, but that’s not so often because people are away travelling a lot."

Picture 3 & 4 - Interior of TPCA, open office area and meeting room  
(own pictures)

Phone
Phone was not so much used and this due several factors, the prominent being language barriers and the hardship of getting through to people due to meetings and travels. Some irritation concerning the lack of mobile discipline was also expressed in the interviews. Below are some notions of the phone as a communication channel.

"Well phone, depends on who and what it’s about, but when a different language is involved it’s set for misunderstandings"

"Telephone is not so good for problem solving"

"I use my phone less than I used to, in benefit for e-mail. Access, if someone doesn’t answer you send an e-mail instead."

"You won’t hear my phone ringing, it’s on vibration, there ought to be a law stating that, then meetings would have been much calmer. We have a very bad meeting discipline when it comes to phones, and that goes for the common areas as well. I mean, am I to interrupt the meeting with you guys if my phone rings? I have purposely made a cut down on phoning."
Phone Conference / Netmeeting / Video Conference
Given that the project stakeholders are globally distributed and that the project members are frequently out travelling, communication channels like phone conference, netmeeting and video conference were considered important. However they were not considered comparable to each other. Below are an extract from a discussion held during an interview:

"I find video conference useless. It’s overrated. Its often bad sound, people sit and stare on details which got absolutely nothing to do with the topic, and the technology fails. Often you just sit there and make jokes and wave to each other, but it wasn’t really the point."

Interviewer: - Would it be a good channel if the technology worked better?

“No, it still doesn’t replace sitting down, it feels like it’s glued on, it’s a salesperson that has done his job well, selling the system. Just because you can see someone its like it would be as you were in the same room, but it isn’t.”

Interviewer: - And how about netmeeting?

“Netmeeting together with a phone conference, absolutely adds value. Cause then you can share the same document and speak about it at the same time, and that’s good.”

Below are some more comments concerning these channels:

“Video conference may work for problem solving, however not comparable to face-to-face. Not used so much, can be increased. It’s less anonymous than e-mail; you commit more, more energy.”

"We are having more and more netmeeting. Video conference, I can’t see the point with it, mostly disturbing to watch the others pick their noses. Nonetheless I want to have met beforehand, that’s important, even when using video conference”
“Mail is good due to time difference, but when there have been too many e-mails going back and forth, it’s time for a phone meeting.”

“I use phone conferences a little, but never video conference, it has died out because the little extra you get out of seeing each other is mostly disturbing, I find netmeeting better, which means that you connect your computers and have a simultaneous phone conference, it’s more efficient, showing results in power point. It’s more important to watch pictures than each other.”

**Intranet and Project Home Page**
The intranet was generally viewed as important but it was stated by many that it did not work properly. It was generally regarded as too time consuming to find information there. Uncertainty about the information accuracy, last update and gathering method were also said to be a problem. The project home page was under construction and not yet in full use, but viewed as a good tool for communication within the project and even more so towards outside stakeholders. Below are some comments on the usage of the intranet and project home page:

“Even though everybody has access to the intranet you know how people are, they don’t take the time to go in there and browse around. So far I have mostly used the fileserver. In my old project you could save it directly on the home page, which was good.”

"Earlier projects uploaded in common way, that was great, especially for me who was new to see how it was written and how they solved certain problems. There will be one in this project as well. There is a search function which is great."

"No not since we introduced Orbis\(^\text{10}\), cause it just gets worse and worse, its so slow and you cant place links that stays, its constantly changing in a bad direction and you cant search and find stuff there. It just kills everything that’s there. It is slow and a lot of graphics and fancy stuff. For no use. They have completely missed what the user wants …”

\(^{10}\) Orbis - the name of the intranet
An additional channel for communicating with other Tetra Pak employees around the world mentioned by a few of the project members were the virtual teams\textsuperscript{11}. This was mailing lists where discussions took place and where new comments made were posted to the members of that list. These virtual teams were viewed as a helpful tool for seeking out information:

“Virtual teams mean that you send out a question and get an answer. It’s very good, free knowledge, one risk though, if you don’t control this information our standard is destroyed.”

A Journey North

After an intense but inspiring and rewarding time at Tetra Pak we leave Lund on a Wednesday afternoon. The evening sun is just about to let go of the day as we make our way out to the highway with the destination set to Linköping. During the four hour drive back we try to figure out what we have actually seen? What kind of understandings can we add, theoretically and practically? Can we add something? We feel like there’s definitely something in there, in the overloaded Mp3 player, that waits to be unfolded. But what? A pattern, an insight, a model perhaps? We realise that the empirical gathering part of the study has come to an end and in front of us lay weeks of listening to interviews trying to decode, interpret and analyse what’s really in there. We arrive to Linköping later that evening wondering, what would we find?

\textsuperscript{11} Virtual Teams - internal world wide Tetra Pak discussion groups were questions are posted and distributed by e-mail
In this chapter we will discuss and link the perspectives presented in the frame of reference to the empirical findings made in our case study of the CSL project. To this discussion we will add our own reflections, thoughts and interpretations. This whole section will strive towards revealing the answers to the research questions stipulated in the problem discussion and towards fulfilling the purpose of this study, namely:

“The purpose of this study is to explore individual communication behaviour in a project-based organisation and from these understandings create a practical framework for discussing and actively managing project communication.”

Introduction
In order to make it clear to the reader how this analysis have been built up we will start by briefly presenting the different parts of the analysis. First, we will look deeper into which communication channels that were used by the individuals in the CSL project and how the different channels were valued. We will then move on to discuss how these individuals perceived the reality of working in the project, focusing on the tasks and roles and also how communication and cooperation was conducted, both within the project and towards outside stakeholders. Finally, the understandings derived from the first two parts are combined and developed into a vocabulary and a practical framework for discussing and managing project communication. Before moving on to the first part we will present the prerequisites we see as fundamental for the following analysis.

Prerequisites for Analysing the CSL Project
Before starting the analysis we want to make clear under which circumstances this analysis is valid. As discussed in the methodology chapter, our view is that since a part is always depending on the whole, one need to study the whole as well as the part if new understandings are to be reached. It is our strong belief that without the understanding of the contextual factors under which the project operates, valid and accurate conclusions can hardly be made, why taking them into consideration is crucial in order
to understand why individuals choose to communicate in a certain fashion and how that behaviour can be supported. The prerequisites for this study are the following:

**Market forces:** Industrial development organisations such as TPCA constantly compete against the development organisations of Tetra Pak’s competitors to deliver cost efficient solutions to its production facilities. The need to sustain and strengthen competitiveness makes it vital for such an organisation to actively manage its knowledge resources. Furthermore it can be argued that in order to sustain competitiveness on a global scale, organisations of this kind must not only search to increase accuracy and speed in operations but also they need to be able to integrate highly specialised knowledge into well functioning project teams. In addition this specialised knowledge can to an increasing extent imply that also languages, nationalities and cultural backgrounds need to be integrated. These market forces does in our view imply the creation of project structures that can support and manage these complexities without hindering the leverage of specialised knowledge’s into competitive technical solutions.

**Workload:** The workload is heavy on the members of the CSL project and within the TPCA organisation. This is a situation not likely to change in any significant way, at least not in the near future. It is a lot to do and it will continuously be a lot to do. A philosophical and societal discussion concerning the right and wrong of this phenomenon will be left to other to explore, and a heavy workload will simply be regarded as a prerequisite under which the study has been made. The challenge is then of course to seek ways to further support the individuals in handling this heavy workload.

**Simultaneous project participation:** Furthermore, many of the project members also participate in other projects and activities which is a result of their knowledge being highly appreciated and that many tasks requires the integration of several knowledge areas. Even if the number of project participations can be discussed, it somewhat lays within the idea of project-based organisations that specialised knowledge is, and should be, used simultaneously in different projects.

**Motivation:** The individuals in the CSL project are in general very motivated and are trying to find the best solutions they can given the time available. After having studied
the CSL project we hold the assumption that even if the workload should decrease somewhat, the individuals would soon fill that extra time with new activities, since the level of ambition, engagement and willingness to help would constantly add on the workload. This implicates that the key question is how the time available should be used most effectively?

1. Exploring Individuals Choice of Communication Channels
The predominant communication channels used by the project members of the CSL project were e-mail, face-to-face interaction, phone, and netmeetings. Furthermore they had to their assistance intranet, fileservers, project home page and video conference. We will now analyse the project members’ views on the essential traits and possibilities inherent in the different channels and then conclude with a discussion where existing communication theories on the field will be challenged.

E-mail
E-mail was in general regarded as crucial for communication, both within the project and towards outside stakeholders. In order to seek a deeper understanding of the popularity of e-mail we have developed four elements of e-mail based on the empirical findings, and the discussion in this chapter will be based on these four elements:

- E-mail as a individual memory storage
- E-mail as a documentary archive
- E-mail as a catalyst of tacit knowledge
- E-mail as an asynchronically but always present work companion

By e-mail as a individual memory storage we refer to that e-mail enables its users to view and process messages when time is available. Moreover it presents the opportunity to go back and view it once more for clarification and as a reminder of the tasks at hand. This was a much appreciated function by the members of the CSL project and we argue that it can be understood as a remover of weight from the bounded rationality of the human brain. Moreover it has been argued by Robert and Dennis (2005) that the ability to process a message increases with time. The time factor can in this instance be viewed
as both the opportunity to process the message in an individually chosen pace and that it can be reprocessed later on.

*E-mail as a documentary archive* refers to some extent to the discussion above, which emphazised e-mail as individual memory storage, but also adds the dimension that made agreements can be revised later. This was a useful function both in communication made within and without the project, since disagreements could be solved by using historic mail correspondence as evidence. Arguably e-mails then also hold the potential to remove uncertainty in relations due to its written and to some extent formalized nature, a benefit not offered to the same extent by immediate channels such as phone and face-to-face communication, where messages are personally rather than formally recorded. This feature of e-mail is an empirical finding which is not considered in the theories of media choice we have come across in the research process of this study.

By *e-mail as a catalyst of tacit knowledge*, we would like to bring forward empirically recorded notions amongst the project members that writing down a message demands a higher level of focus. This was regarded as a benefit both for the sender and the receiver. The sender had to articulate clearly what he or she really meant, this can be seen as a way to articulate know-how (tacit knowledge), in order to make the receiver understand the message and to take the desired actions. This can be seen as a strengthening of the possibility that the receiver actually gets the message right and thereby helping the receiver to save time and energy in decoding and by not taking incorrect actions. Moreover, the cognitive effort put down by the sender were also said to produce some crystallisation of their own thought and knowledge, which was viewed as helpful. This can be viewed as compensatory adaptation, meaning that media lower in naturalness is demanding better thought out messages in order to reduce communication ambiguity according to Kock (2004; 2005). This demands a higher cognitive effort but is often giving as good or better results than a media higher in naturalness. The effects of this phenomenon were even greater for both parties when communicating across language, culture, and knowledge boundaries, since it then was even more important to be clear and accurate and it was mentioned that this cross boundary communication was always a bit tricky. However, often it helped to have met the person one time before and this also supports Kocks (2004, 2005) thoughts on schema alignment meaning that if people have similar experiences it can reduce communication ambiguity.
Finally we propose that e-mail also can be viewed as an asynchronically but always present work companion, meaning that it can move above geographical and time related differences. Especially the fact that e-mail are not hindered by time difference makes it valuable, especially when cooperating with factories where there often is a great time difference, but also that it thereby respects people’s time in the sense that they can process it when time is. This notion, however can be questioned as the time available to go through mailboxes is limited and the amount of mail constantly increasing. By always present work companion we mean that the increased usage of laptops and the rise of internet availability make it free to the user when to process the information. This freedom of when to process is bringing with it that e-mail correspondence can be done while waiting at airports or travelling by train which was viewed as very valuable, but also that e-mail can make intrusions in the private leisure time. These advantages (even though some participants did not view the intrusion of private time as advantages) has been considered and highlighted in some earlier studies of communication behaviour (for example Sapsed & Salter, 2004; Kock, 2004) but they are not incorporated in the theories media naturalness and cognitive model of media choice but rather treated as side effects and left out of the models. The strategies to handle the immense flow of e-mails seemed to be individually designed, as did the usage of communication channels in general. These individual strategies are in our view an important finding, and will be further discussed in the chapter on individual strategies later on in this part.

**Face-to-Face**

Face to face was considered as an unmatched communication channel, and was viewed as an absolute necessity for some activities. As presented in the empirical findings, face-to-face interaction can be divided into three types; formal meetings, informal meetings and informal interaction. The formal weekly project and test planning meetings were used foremost to plan, coordinate and display actions from the different knowledge areas in the project. Informal face-to-face meetings were often used for joint problem solving. They were not regularly scheduled in advance but rather booked when the need arose and involved gathering of the competences needed. The third type of face-to-face interaction was informal face-to-face interaction consisting of walking around in the open office area and “tap on someone’s shoulder”. This was done both to coordinate and plan activities and meetings but also often used to find and validate information.
Empirically it was also shown that face-to-face interaction in all forms served as the foundation for creating energy and team spirit.

Informal networks seemed to be a very important factor for how the informal meetings took place. People that belonged to the same knowledge area and/or had been working together before talked more often informally with each other than they did with people they had not seen before the CSL project. The project members noted that a benefit from the kick-off was that it was much easier to go and “tap someone on the shoulder” afterwards when they were clear about the other members’ knowledge and role in the project.

When it comes to the factories and the suppliers the role of face-to-face interaction were even more stressed. It was stated that it was difficult to understand the other party without meeting them face-to-face and even harder if you had never met them before. We now turn to our media choice theories to analyse why the use of face-to-face interaction was so popular for many different tasks.

Robert and Dennis (2005) is proposing that face to face interaction, regarded as high social presence media, demands high attention since the receiver needs to be at the same place in the same time as the sender and consequently that the attention cost for face to face interaction is always high. Face-to-face is demanding high attention and is therefore most likely providing the sender with a motivated recipient. This seems to be supported by our findings, sending a mail could never guarantee a motivated recipient. In the empirical case the individuals were in general very short of time and had to spread their attention to many different tasks, we believe that this can lead to the need to take someone’s attention by booking a face-to-face meeting or walking over to someone’s desk instead of waiting to get attention by sending an e-mail that face the risk of drowning in the e-mail flood. Since the members in general had high motivation once their attention was caught the attention part of face-to-face interaction can be viewed as important in the project-based organisation of TPCA. The battle for resources in project-based organisations is therefore in our view a battle of the attention and energy of its members.

Kock (2004; 2005) can help us in understanding the extra value of face-to-face interaction when it comes to stakeholders outside the TPCA organisation such as the
test factories and the suppliers. Kock’s ideas suggests that a decrease in media naturalness gives an increase in communication ambiguity, and the empirical findings suggest that this ambiguity can be extra difficult when it comes to communicating with stakeholders whose cognitive schema is different. This cognitive schema consists of earlier experiences and can be the result of both cultural and educational differences. We believe that the difference in cognitive schema, both towards the suppliers and the factories makes it more important with face-to-face interaction to reduce communication ambiguity since face-to-face is more natural and thereby reduces communication ambiguity.

The formal meetings were also viewed as important, some project members noted that even if the meeting did not touch upon something that was directly affecting their own work it could be valuable to just be there and listening in order to get an idea of what others are doing and how the work is progressing. Also the kick-off was considered important in the way that everyone got the same information at the same time. One thought on this is that the meetings, where the attention is high may serve as a mean to align the project member’s cognitive schema so that future communication will lead to less communication ambiguity. The importance of face-to-face meeting early on in a project can therefore not be stressed enough, a notion also supported by Sapsed et al (2005).

**Phone**

Our empirical findings are a bit contradictory concerning phone as a channel. On one hand many of the interviewees responded that they did not use the phone that much, on the other hand there were some comments made that the phones were ringing too much and that this was a distraction. Logically this must imply that it is the phones of others that are ringing too much, or?

We argue that the decrease of phone usage can be discussed as an result of the introduction of many other channels, and that the individual attention cost, both for the sender and the receiver, was normally too high compared to the individual gains attained using the phone. We will here make a short stop and introduce to the reader our channel choice formula which implies that the choice of channel need to fulfil the requirement of:
The individual gain, based on the empirical findings, is defined as the possibility to save time and the possibility to reduce uncertainty by receiving accurate information. The attention cost is derived from Robert and Dennis (2005) notion that different media presents different usage cost to the receiver in the form of attention. This formula does imply a rational behaviour where the individuals, aware of the personal gains and costs of certain channels, choose the communication channel that presents them with the highest gain compared to the cost. In our interviews we found this seemed to be the case and an example of this is the development of individual strategies.

This relation between attention cost and advantage can be said to shift when immediate action is called for, or when a message has drowned in another channels and therefore needs to be reminded and leveraged. During these circumstances the phone was good to use and the individual advantage thereby exceeding the individual attention cost of using it. The reluctance to use the phone can also be an practical implication of the project sitting together, if someone were at their desk you could just walk over there, and if someone were out of office one assumed that he or she were busy and then you sent a mail instead in order to avoid having to interrupt someone in what he or she was doing. An interesting comment was however that phone was good to use in stressful situations, when shortage of time or close to deadlines it worked as an accelerator of action. This seems to support Robert and Dennis (2005) proposition that higher social presence media demands more attention and gives more motivation than a message sent through a lower social presence media. The fact that phone rarely is the first alternative before e-mail, unless it is concerning an urgent matter, but that it is rather used as a mean to remind about already sent messages is a fact that also supports Robert and Dennis (2005) recommendation about mixed medias advantages meaning using one channel for getting attention and motivation and another channel for providing ability.

It further seems like using the vocal intonation (voice), a feature that according to Kock (2004; 2005) heightens the media’s naturalness, does not add so much value as suggested by the theories when comparing the channels phone and mail. We further argue that the difference in cognitive effort is not as big between phone and mail as it is
between phone and face-to-face. We suggest that the limited usage of phone is due to
the fact that it gives increased cognitive effort but no compensatory adaptation in the
form of better thought out messages, something that e-mail has the potential to create.
People seem to treat a phone call as a face-to-face interaction and do not prepare or
think through the call in advance; why the cognitive effort can be said to increase
without being mitigated by compensatory adaptation.

To sum up, our findings suggest that the foremost advantage of phone seems to be that
it holds the possibility to take attention from an receiver why the sender do not have to
await and wonder whether his message will get attention. This feature of the phone was
by some of the project members used in their individual communication strategies
which is presented in the chapter of Individual Communication Strategies.

Phone Conference – Netmeeting – Video Conference
Conducting meetings with geographically dispersed participants could in the CSL
project be made in three different ways; phone conference, netmeeting and video
conference. The by far most preferred and used one was netmeeting. This meeting form
was regarded as the next best option after actually travel to meet the person face-to-face.
However, complex joint problem solving was still preferably done through a face-to-
face meeting. Moreover, it was stated amongst the project members that it was
important to have met at least one time before, both to get a picture of the one you are
talking to but also a feeling for the physical surroundings’ of that person. This was said
to increase the accuracy and understandings of the communication made. Interesting to
note however was that when the dimension of physically seeing the other persons, as in
video conference, was added it was by many members regarded as negative and
distracting. “It does not add any value to see the other guys sitting their and pick their
noses”, was a statement made by one of the project members. If analysed with the
individual channel choice formula presented earlier one can argue that the attention cost
of the channel video conference did not create individual gain.

It is hard to get a grip of whether the disliking of video conference was a function of
being unaccustomed with the situation, of malfunctioning technology or of the fact that
the attention cost of also seeing them was just too high, taking attention away from the
actual discussion. We argue that it is a combination of the three, but we also want to
stress that some members said that they were accustomed to it and that even if the
technology were to function flawlessly, it would still not add any value to see the others. This could imply that the attention cost of using video conference actually is too high in comparison to the advantage that watching the others give. It should also be stated though that the participants of the netmeeting we observed had all met the other participants at least one time before, many had met several times and some had also worked together before. The situation was the same also for the other netmeeting and video conference situations discussed in the interviews. This makes it hard to make a fair judgement of the usefulness of netmeeting versus video conference. Our empirical findings however shows that people that know each another fairly well and have met before do not value video conference over netmeeting.

“I use phone conferences a little, but never video conference, it has died out because the little extra you get out of seeing each other is mostly disturbing, I find netmeeting better, which means that you connect your computers and have a simultaneous phone conference, it’s more efficient, showing results in power point. It’s more important to watch pictures than each other.”

This quote indicates that documents and pictures displayed at a screen are in our case study more valued than seeing each other on a screen. The difference between video conference and netmeeting in physical arousal rather seemed to be an advantage in favour of the netmeeting, since the physical arousal gained in the video conference rather seemed to disturb and to take focus of the subject. According to Kocks (2004; 2005) definition video conference is higher in naturalness due to the ability to see and express facial expressions and body language and should thereby be reducing communication ambiguity and cognitive effort compared to netmeeting. It seemed like compensatory adaptation was achieved by showing figures and documents on a screen and the findings concerning the differences in preferences suggest that the brain is in this case more helped by this than facial expressions and body language when schemas were sufficiently aligned. To summarise; when the cognitive schemas of meeting participants are enough aligned and the possibility to listen to and express vocal intonation (voice), pictures outperforms seeing facial expressions and body language. This can be understood as compensatory adaptation in the respect that better thought out messages are communicated through the pictures.
Intranet and Project Home Page

The intranet and the project home page were not that popular means of gathering information. However it was recognized that they could be useful for outside stakeholders, and also for members of other projects. The main reasons for not using it were that it was slow, it was hard to find the things you looked for and you could not always rely on the information found (that it was the latest version and/or how the information was gathered). The intranet was by many project members viewed upon with scepticism and we also heard some jokes made about the intranets limited capacity. It seemed like the trustworthiness of the intranet as a reliable source of information was rather low. However though, some project members seemed to have larger trust in it, and we noted that there seemed to be a correlation between years of employment and usage of the intranet, where project members with less years of employment tended to use the intranet more.

Here we also want to bring up the discussion of technology’s role in handling knowledge which we presented in the frame of reference. Bresnen et als (2003) conclusion that knowledge processes is more favoured by social processes than IT tools seems to have found support in our case study, the informal networks was considered crucial for these knowledge processes. The notion that the persons that used the intranet and/or home pages in general had fewer employee years at Tetra Pak indicates that the informal network developed over time ruled out the need and/or motivation to search on the intranet. Brown and Duguid (1998) stresses the importance of that the technical device fits in to the organisational context and supports the informal structures. The physical seating at TPCA did support the informal networks, however though the intranet had not yet reached that level, as cited before:

“ No not since we introduced Orbi$, cause it just gets worse and worse, its so slow and you cant place links that stays, its constantly changing in a bad direction and you cant search and find stuff there. It just kills everything that’s there. It is slow and a lot of graphics and fancy stuff. For no use. They have completely missed what the user wants …”

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12 Orbis - the name of the intranet
Further on the use of virtual teams that were used by some project members in order to get ideas from the factories also seems to follow the arguments of Brown and Duguid (1998) that the informal technologies often are the most successful ones.

**Individual Communication Strategies**

The empirical findings show that the project members in the CSL projects had developed different ways to handle information gathering and communication. Many had developed explicit or tacit individual strategies to cope with everyday work. These individual strategies were not only limited to communication but also included the managing of time. Given the shortage of time, the flood of information (foremost by e-mail) and the bounded rationality of human beings it is not surprising that the project members formed these individual strategies regarding both e-mails and calendar. However, these strategies can be problematic in our opinion when different individuals adopt too diverse strategies for their behaviour.

One project member concluded that you have to make a choice between either doing everything at a lower quality or concentrate on a few things and do them really well. This choice is left to the individual to make, and that is according to Söderlund and Bredin (2005) a typical problem for the project-based organisation. This choice was treated differently by different project members and some always tried to do all of their tasks but to a lower quality whereas others just did the ones they found most important, and if no one reminded them by phone or additional e-mails some tasks were just left behind in the mailbox. There is apparently an implication by leaving choices like this to the individuals. Even though, individual “gut feeling” as an instrument for the managing of time is effective but it still poses a problem when people adopt different strategies since this can lead to irritation and misunderstandings that hinders cooperation. Further on the empirical findings showed that it took a lot of energy to filtrate and sort out what to do and in which order to do it.

We found that some project members did deliberately cut down on mailing by for example starting to send out-of-office reply and/or just ignoring the mailbox and do the tasks at hand first, reasoning that if it is something important they have to call me instead. Others were deliberately cutting down on phoning and put larger emphasis on the mail. A quote on this:
"You won't hear my phone ringing, it's on vibration, there ought to be a law stating that, then meetings would have been much calmer. We have a very bad meeting discipline when it comes to phones, and that goes for the common areas as well. I mean, am I to interrupt the meeting with you guys if I my phone rings? I have purposely cut down on phoning."

When some people try to avoid the phone and others avoid the mailbox a problem in communication may arise. Also within the mail strategies there were differences, comments were made that the function of CC was a bit overused when mailing but that this could be counteracted by the “Ctrl A Delete” function when the mailbox were flooded. Finding strategies to handle the mailbox were central to all project members, here is one quote on the amount of mail:

“And it’s the same home as well, and Saturdays and Sundays and evenings, the mailbox. The Outlook, without it you would have died. Without it work wouldn’t function, it functioned in the old days but I don’t know how. Back then there was fax and phone, we used the phone much more, I have very few phone calls these days.”

Our findings suggest that these individual strategies, deliberate or not, often worked well in reducing complexity at an individual level. We argue that the development strategies is perfectly understandable and not a problem in itself unless they are too differently constructed. Suppose for example that one project member deliberately seeks to construct the mail as comprehensively and concluding as possible and avoid to put CC unless really necessary, and others distributes non concluded mass mails. In a case like this the risk for irritation and misunderstandings is obvious. We therefore suggest that project communication agreements are established in order to help all parties save time, irritation and misunderstandings. We suggest that such an agreement could contain the following points: Share Individual Strategies, Mail Hygiene, Phone Norms, Level of Summarization and Level of Translation. These are further explained and discussed in the third part when we present our project communication framework.

**Concluding Discussion**
Over all our empirical findings suggest that both the media naturalness theory (Kock, 2005) and the cognitive model of media choice (Robert and Dennis, 2004) can be used
to understand and explain communication behaviour in project-based organisations. However though, the case study did provide us with findings that may add additional understanding to individual communication behaviour in a project-based organisation. Even though our empirical findings support the main idea of the media naturalness theory, and the idea of compensatory adaptation, we have also seen that the importance of e-mail goes beyond that of being just a communication channel. Moreover, the existence of strong informal networks seems to push for and direct communication in a face-to-face oriented direction. The discussion concerning netmeeting and video conference did also show that pictures may prove more useful than facial and body expression for work groups whose schemas are sufficiently aligned.

Robert and Dennis (2005) notes that low social presence media creates lower attention and lower motivation, and this seemed to be the case in the CSL project. However though the increased ability, which according to the same theory should be gained when using lower social media, did not appear in our empirical findings. We argue that the lack of time, the low trustworthiness of the channel and the channels low ability to carry contextual information are factors that might explain this lack of support for the theory. This is shown in Figure 15.
What the figure seeks to describe is that the relative gain for the individual is higher when using high social presence media, since the ability reached by using low social presence media, in a project-based organisation context, is lower than suggested by Robert and Dennis (2005). The ability to process the message is consisting of three elements; the time available, the amount of information helping to grasp the subject and that the level of intelligence possessed by the receiver is enough to follow the arguments (Robert and Dennis, 2005). The level of intelligence was not a problem in the CSL project, however though time and information to decode information was.

Some project members stated the advantage to be able to reprocess a message when receiving it by e-mail. However, often the overall lack of time implicated that the actual time to go back and reprocess e-mails did not really exist, which gives that the element of time available does not always increase when receiving a message in low social presence media. Rather it can be the opposite, by attending a meeting where the mobile phone and the computer is switched off can give more time for thoughtful consideration than you have sitting at your desk, interrupted by mails, phone and/or “taps on the shoulder”.

Figure 15 - Inverse relationship between motivation and ability to process in a project-based organisation
(Own model based on Robert and Dennis, 2005)
Further on, when extending this discussion to the intranet and the project home page we saw that not only time lowered the ability to process but so did also the lack of sufficient information. The practical reality showed that uncertainties about source and collection methods restrained the ability to process things from the intranet or project home page. This had led to a low credibility of the intranet as a reliable source of information, which arguably further enhance the effect described in the model and thereby the strive for face-to-face interactions to verify information.

Further we would like to add that the face-to-face interaction was sought after for both problem solving and motivational aspects, face-to-face interactions seemed to provide both high motivation and high ability to process. Even though Robert and Dennis (2005) argue that the ability would decrease in face-to-face interaction the empirical findings seem to suggest that this is not totally accurate in our project-based organisation. However, even though they strived to solve problems through face-to-face interaction, a break for individual thinking and revising of the case was sometimes needed when the problems was extra tough, which supports the original model proposed by Robert and Dennis (2005).

If we move to communication conducted with outside stakeholders, such as suppliers and factories, we would like to stress a practical implication of the cognitive model of media choice, namely that receivers with a different background and a different business logics have decreased ability to process a message since they do not often have the additional contextual information. Here we suggest that Robert and Dennis (2005) discussion of complex and simple messages is worth considering, when the reality is constrained by time and ability to process is lower in face-to-face meetings one needs to put forward simple messages in order to affect a persons understanding through the central route in the brain. This implicates that when communicating with a receiver that does not have so much common background and is not automatically motivated to process your message you should go there and present a simple message face-to-face in order to get the highest impact.

To summarise we can conclude that a split reality and time shortage affects the usage of communication channel in that way that individuals that sends a message can not wait to get attention from the receiver but rather have to take attention from the receiver in
order to get the outcome sought. We also found that when people know each other well the face-to-face interaction did not seem to be disturbing as suggested by the media naturalness (Kock, 2004; 2005) and the cognitive model of media choice. We now move on to explore the context of the communication in the next part.

2. Exploring knowledge at work

It is the purpose of this chapter to add an understanding of the context and structures in which the communication behaviour studied in previous chapter takes place and too see what the communication aims at achieving. Which tasks are actually to be performed? This is based on the notion amongst both ourselves and the project members that communication does not exist for its own sake but for the sake of achieving certain ends. We will therefore present seven activities that we have identified to be of key importance and relate them to four roles that we have seen within the CSL project; Project manager, Sub project leader, Coordinator and Technical specialist. These tasks and roles are based on our understanding of the specific CSL project. This will be followed by an analysis of cooperation and communication within the project as well as with outside stakeholders. The chapter ends with a concluding discussion.

The Project within its Organisation

As expressed in the methodology chapter, we believe that it makes little or no sense to study a phenomenon without understanding in which context and for which purpose it takes place. For this reason it was our intention to unveil the overarching structures and purposes surrounding individual responses and actions. This is in our view even more important when studying a project that in accordance with Sydow et al (2004) is embedded within a larger organisation. Of the four levels that Sydow et al (2004) distinguishes we note that at least two of the levels are clearly having an impact on the project members’ daily life. At the level of organisational units the functional groups provided a belonging, both knowledge wise and socially. Moreover, the project is embedded within the organisations support and administration systems and routines that govern for example time reporting and project planning tools. There were also activities that did not come from a specific project that was part of the daily work, activities derived from an organisational obligation to rapidly assist factories who encounters a problem in production. Further on the project is surrounded by an even larger context,
the Tetra Pak organisation, which supplies an even wider cultural context of entrepreneurship and the notion of freedom with accountability.

The need for understanding contextual factors increase even more since the members of the project does not only participate in one project but in several embedded projects and activities. Moreover the unclear division between the different layers of structure and the individuals’ constant movement within and across these structures makes it purposeful to take on a Whittington (1988) approach. Arguing from this standpoint we suggest that the project members are individual agents operating within given structures and that these individual movements do simultaneously shape the structure, in this case enhancing the strength of informal networks.

We argue that an apparent effect and a structural sign of the individuals actions, constructed to manage the split reality of every day work, were the strong notion of informal networks as a prime source of information and knowledge. Seeking a way to handle an ordinary day required fast and accurate access to information and knowledge, things much more likely to attain through informal contacts with co-workers than through computer mediated systems. This notion was then supported and strengthened by the physical seating of the members in an open office area.

In order to seek an understanding of this we use Grandori’s (2001) division of knowledge complexity: computational and epistemic. Computational complexity “…refers to the number of elements and symbols, and of the possible connections between them” (Grandori, 2001:391) and epistemic complexity refers to the process of observing a phenomena and understanding if, how and why the many elements are connected to each other. In the CSL project the level of both computational and epistemic complexity seems to be high and even though the project is divided into many knowledge areas, they are all part of the same process, and the understanding of how things are interrelated and affect each other are crucial for project success. Finding the root cause to problems was therefore said to be a multidisciplinary and time consuming endeavour. Moreover, the computational complexity of an individual’s day can arguably be said to increase since they do not only participate in the CSL project but also in others, plus that they in between have to manage their personal planning and administration. Computational complexity does accordingly to Grandori (2001) demand structural support, such as document templates, memories and formalized language to
be handled effectively. The earlier discussion of e-mail as an individual memory storage is one interesting example of how individuals seek to handle computational complexity.

**Tasks and Roles within the Project**

In this part we will present the key tasks that we believe is important to handle for the CSL project. They are presented to make it clear to the reader what project work within the CSL project consist of and about which tasks the project members are communicating. It must be stated though that a normal working day seemed to consist of a complex mixture of different tasks that belonged to different projects and/or smaller activities. These activities could belong to both present and earlier projects, since it was common that outside stakeholders such as factories and suppliers returned with complementing questions concerning former activities.

Presenting a concrete picture of what one project member did a typical day is hard since there did not seem to be any typical days, at least the project members found it hard to articulate such a day. However, the aggregated picture from all interviews did provide an overall picture of the tasks performed by the members of the CSL project and we have chosen to highlight seven of these which in our view are the most important ones, see Figure 16. We want to stress that the tasks are performed in an intertwined way and do not necessarily follow the order in the figure. The order is rather derived from the amount of time spent by the different roles on each task, derived from the responsibilities attached to each role. However, every member did perform a mixture of all of these tasks. The intertwined reality of working in the project does thus reveal itself once more.
The reason for discussing tasks and roles is that we saw examples where it was unclear to the project what their role really meant and what was included in that role. The definition of roles can also be seen as individual strategies coloured by individual preferences where for example a technological interest may put coordination and planning aside. Uncertainty of the responsibilities seemed to be a bit disturbing to the individual, making it hard to know what to do, how to do it and how much time that should be spent on the different tasks. The generally high motivation and willingness to help mentioned in the prerequisites combined with this uncertainty can be seen as a creator of stress and an unnecessary attention cost. The clarifying of tasks and roles is not only for the individual but also to know what others are supposed to do. We now turn to discuss the tasks.

**Collect and Verify Data:** This task is about finding and collecting data that can be verified and relied upon. The interviewees stressed the importance of getting hold of as rich and comprehensive data as possible. This meant machine and process settings as well how, when and by whom the data was collected. The search for verified data was therefore an important and time consuming business, which could be helped a lot by using informal networks. As discussed in the previous chapter, we argue that the

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<th>Tasks</th>
<th>Roles</th>
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<tr>
<td>Collect and Verify data</td>
<td>Project Manager</td>
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<td>Define and Solve problems</td>
<td>Sub Project Leader</td>
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<tr>
<td>Test and Validate solutions</td>
<td>Coordinator</td>
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<td>Sub-project Coordination</td>
<td>Technical Specialist</td>
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<td>Extract and Display solutions</td>
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<td>Translate and Promote results</td>
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**Figure 16 - Tasks and roles in the CSL project**
(own figure)
answers from the interviewees can be interpreted as a desire to get hold of contextualised and accurate information by using increased informal face-to-face interactions which in terms saves time and decrease uncertainty.

**Analyse and detect problems & Define and solve problems:** These two tasks has very much in common, however the search for root cause analysis often leads to the finding of more problems than the project actually aims at solving. Defining and choosing which of these problems that needs to be solved in order to reach the project objectives then become a central part in itself. These tasks were considered as group based rather than individual since joint problem solving needed joint problem definition. Joint ownership of problems in general was also regarded by the project members as a fundamental element for the creation of energy, motivation and dynamics in the project teams. This, in accordance with Robert and Dennis (2005), was believed to be created in meetings between people, why face-face is not only a time saver and reducer of uncertainty but also a creator of energy.

**Test and validate solutions & Subproject coordination:** Testing the solutions created in different parts of the project meant a coordination and integration of knowledge where cause-effects relations could be discussed across subproject boundaries. Even though the project members stated that differences in knowledge within the project were not a hindering factor for cooperation, they did admit that the core knowledge of other groups was only fully understood by that group. We therefore argue that the testing and planning meeting therefore filled a very important function as a forum for knowledge transfer, joint problem solving discussions and creator of energy, and that they perhaps could be given even more weight and time in the future?

**Extract and display solutions:** By extract we refer to the ability to extract and conclude information so that others could understand it, and to understand it with less effort was considered as a key factor since time and attention was limited. Moreover it was clearly stated that it was important for cooperation to have a general understanding of the others work, to see progress in others work and to display progress within own part. Research done by Kellogg (2006) emphasises that the displaying of knowledge towards other groups and thereby telling other members about who knows what is an activity that should be actively pursued in project work.
Translate and promote results: When moving information across boundaries translation of messages to fit the recipient is arguably important and there was a clear awareness of this in the CSL project. Moreover, the empirical findings showed that it was sometimes hard to get through with a message to outside stakeholders. We argue that the translating and promoting of results can be strengthened even more through increased focus on information- and knowledge champions that can promote solutions, both during the project phase and after its completion. The understanding of logics and rationales for action and for processing information at the recipient side is something we see as crucial for communicating across the boundary of the project; this will now be further developed in the following chapter.

Communication and Cooperation across Boundaries
In this chapter the theories presented in the knowledge chapter will be used in order to discuss communication in the CSL project. We will use them as analytical lenses to provide an increased clarity of our empirical case in a project-based organisation. The question of interest in this study is not only how people communicate with each other but also why, what is the purpose of the communication? Once more we would like to stress that we will analyse the project members view of the cooperation; we have not interviewed the suppliers, the test factories or the value segment. First we will analyse the foundation for cooperation and then move on to the project and its different stakeholders.

In our interviews we found that the common ground for cooperation was to meet at least one time before engaging in more in-depth interactions. The importance of a general understanding of the other individuals work was stressed by many project members. Another factor needed before engaging in cooperation was the screening and measuring of the other parties’ knowledge.

We found that cooperation seemed to be hardest to achieve when working across knowledge boundaries, which foremost existed between the project and its outside stakeholders, see Figure 17.
Within the project which includes cooperation between different sub-projects cooperation seemed to be relatively unproblematic. The easiest cooperation took place, according to the project members, when working in their own sub-project as lamination or slitting for example. However, this was also the case within the project between different sub-projects, and different background and knowledge did not seem to hinder problem solving.

We will now bring forward the concepts of communities and collectivities of practice put forward by Lindkvist (2005), and remind the reader that even though these concepts may be posed against each other in theory, the distinction is not as clear in reality. In our view these concepts can be understood by looking at communities as groups coming from a shared history and collectivities as groups with less amount of shared history moving towards fulfilling future objectives. Arguably communities can be said to be held together by history and common knowledge whereas collectivities need clear and shared objectives to cooperate. Using these concepts when looking at the CSL project we argue that the members have been sourced from a community-like base, the TPCA organisation, where several of the members had been working for a long time within TPCA and they had also worked together in earlier projects, especially within the core team of the project.

However the number of knowledge areas, the level of specialised knowledge and the fact that a few members were new and a few were sourced from without the
community-like knowledge base hinders us to view the CSL project as a community of practice. The number and the spread of the knowledge areas make it more practically useful to view the CSL project as a collectivity of practice in need for clear and shared objectives in order to make cooperation work. The risk we see here is that if the core team of the project, showing characteristics of being a community of practice, operates as if the whole CSL project is a community of practice cooperation may become harder.

When using Carlile’s (2002, 2004) discussion of knowledge boundaries as analytical lens we believe that there were not really a problem with knowledge boundaries within the CSL project, but rather that there were enough common knowledge and ability at an individual level to overcome the boundaries. The kick-off contributed with knowledge about each others areas and responsibilities, something that was considered very important in order to facilitate cooperation, both within and outside the project.

One cannot discuss knowledge management without bringing up Grant (1996) and his discussion concerning cooperation and coordination. His central assumption for effective knowledge management is based on the idea that it is not about making everyone learn what the others know but rather it is about coordinating their knowledge’s. However though, he does recognize that a certain level of common knowledge is still needed for high complexity tasks. It was shown in the case study that this was the case also for group based problem solving in the CSL project. The acknowledgement of the importance to know about each others areas and responsibilities can somewhat be understood by Grant (1996) stating that common knowledge can also take the form of knowing what other persons know, to recognize their knowledge domains. This implies that the activity of displaying knowledge is central for project work. The CSL project showed a high level of awareness of this, and the kick-off did provide an increased knowledge about what the others knew. However, even more was asked for by the project members, and suggestions for how to take this issue further is presented under the structure part in our Project Communication Framework found in the last part of the analysis.

Cooperation with outside stakeholders was considered more difficult. The outside stakeholders consist of the suppliers, the test factories and the value segment. Also the project forum and the milestone review team are outside stakeholders, interested in different information from the project. The milestone review team were more focused
on technical solutions whereas the project forum focused more on the business case, meaning whether the project can continue or not. This shows that even within the organisation, communication to some extent needs to be tailor made, to satisfy different interests and logics. The different stakeholders all have different kinds of interest in the project. This quote from one of the project members highlights some of this difference:

“It’s important to know what kind of information that could make sense to give to the segment. The information to the factories and to the segment should not be the same. The segment is generally interested in two things: How cost will evolve and how performance of packaging material will evolve? The factories are more concerned with questions like; how can this project help me to reduce the gap? Even if some communication has been done, more can be done.”

Our interpretation of the empirical findings is that there is a semantic boundary which demands translation between the project and the different stakeholders and this implies that it is not only enough to just bring the information face-to-face, but also that someone actually puts effort into translating it so that it fits the recipients need for information. Further it seems like there sometimes is not only semantic boundaries but also pragmatic/political boundaries present when communicating with outside stakeholders, for example sometimes the factories were used to act in a certain way and then the project claims that a different solution would be better, which means that the existing and invested knowledge in the factory will be challenged.

As hinted in the frame of reference we believe that sometimes a broker (Brown and Duguid, 1998) can be helpful in crossing a pragmatic boundary by transforming the knowledge, this since the broker is affected of what happens at both sides of the boundaries. Here a practical implication could be to involve outside stakeholders in the project. This was to a certain extent done, the value segment had a representative in the project that also participated at the kick-off, and this was viewed as valuable. This kind of link was missing from the test factories, there were official coordinators which were

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13 The reducing of gap is referring to the difference between the technical speed stated in the specification and the practical speed actually reached in the factory. This is one of the things that the factories are evaluated on.
participating in regularly netmeetings with the project, but they were not actually in the project.

Moreover it is not only the logic that differs but also the level of common knowledge, a factor that according to Carlile (2004) is important in determining the capacity to handle knowledge at a boundary. The common knowledge can consist of lexicon, meaning and interests and these features together with the actors’ ability to use the common knowledge is crucial in understanding how knowledge can transform into new knowledge.

**Concluding Discussion**
This chapter has been discussing the project in its context, the actual tasks performed in the projects and also the cooperation needed to perform these tasks. This has been done in order to map the purpose for communication and to get a picture of the structures surrounding the individuals looks like. We have found that one important responsibility for the project manager is to make clear what tasks and roles the project members are supposed to do in order to lift weight of a bounded rationality and to save attention for more important tasks such as problem solving. We argue that an increased understanding and acceptance for these tasks and roles is of crucial importance when discussing communication in a project-based organisation.

Further on we have discussed cooperation and communication both in the project and towards outside stakeholders. Here we have found that knowledge boundaries do not seem to be a problem within the project, whereas both semantic and pragmatic boundaries according to us were present between the project and other boundaries. We believe that these different logics has implications for how communication should be conducted in the way that outside stakeholders with different knowledge and different incentives need tailor-made information, preferably presented face-to-face by an knowledge translator or knowledge broker. This is in line with the findings from the first chapter on individuals’ media choice.
3. Exploring the balance between individual and structure

In this part we will present our project communication framework that builds upon the learning’s and ideas developed through the duration of this case study. This is done in order to make the findings accessible to and useful for both scholars and the management and members of project-based organisations.

Throughout this study our view of project work as a trade of many skills has grown continuously stronger. Everyday work, consisting of participation in several projects combined with a heavy workload, has brought about the development of individual strategies to handle the workload and reduce complexity. Moreover, we have argued that the bounded rationality of the human brain implies that there is a limited amount of attention to the disposal of each individual and that this attention is allocated by the individuals in the shape of individual strategies. We have also showed that the project-based organisation both by its theoretical idea and in its practical appearance, as in the CSL project, places a larger amount of responsibility on the individual to cope and manage a reality that is split between many activities. Based on this discussion we now want to bring forward the expression attention budget, as a concept to be used when discussing the work situation in project-based organisations. We have already proposed that the ratio between individual attention cost and individual advantage directs the choice of communication channel. We now want to stretch the usage of attention and make the claim that it is a useful concept for understanding project work also beyond the aspects of communication.

Attention budget is a concept that applies to all humans since it is derived from how the human brain operates. With this concept we want to follow Grandorins (2001) recommendation of giving bounded rationality a practical application, one that we believe to be meaningful when discussing the reality in project-based organisations. Attention budget is thus derived from the concept of bounded rationality and our empirical findings show that one can not do everything, there is a limit and choices has to be made. This limitation is both cognitively and emotionally derived, meaning that the amount of cognitive effort and emotional energy that an individual can spend on any
certain task is finite. This is true for all humans, but project-based organisations in search for increased competitiveness brings it out in clear daylight. We believe that each individual has their own attention budget and the allocation of this attention is to a large extent done by the individuals of project-based organisations by choosing and prioritising communication channels as well as which tasks to perform.

By this said we now want to add that the attention budget given to each individual meaning their cognitive and their emotional capacity can be used for a wide variety of things, from processing information and solving problems to figuring out which tasks and activities to focus on. The question for a project-based organisation is then how to spend the attention budget of its individuals.

This question is in our view of the outmost importance for both scholars and practitioners of project-based organisations, since it presents us with the possibility to glance up towards the management task of our time, namely how to manage knowledge resources effectively?

By no means will we attempt to fully embrace this mighty question, but we do want to present a practical framework for project communication that may serve as a base camp for future attempts for the summit and for the discussions on how to practically manage communication in project-based organisations. This framework consists of two parts, a vocabulary and a tool, that combined may serve as platform for bringing up communication on the agenda and actively manage it. This is due to our belief that the dismantling of hierarchies and structures may have been too hard on the individuals of these organisations and that new structures must be sought to support the individuals’ attention allocation. We are convinced that these structures may rest on a solid communication structure. Not in the sense of IT-systems, even though they are a important part, but of agreements and arrangements made between individuals for how communication are to be conducted within the organisation. This can be singled out into these two very simple questions:

- How do we help each other save attention?
- What structural support do we need to use our attention most effectively?

Supplying the framework to handle these questions is the task of the next chapter.
A Project Communication Framework

In search for a more effective managing of attention, we will now present a Project Communication Framework consisting of two parts, a vocabulary for discussing and bringing up communication on the agenda, and a tool for actively pursuing improvements. The Framework is illustrated in Figure 18. The blocks of each part will be discussed separately.

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<thead>
<tr>
<th>Vocabulary</th>
<th>Task</th>
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<td>Translate and Promote results</td>
<td>Project Manager</td>
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<td>Extract and Display solutions</td>
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<td>Channel Choice Formula</td>
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Figure 18 - Project Communication Framework
(own figure)

Project Communication Vocabulary

This project communication vocabulary is meant to serve as a foundation for discussion amongst practitioners as well as scholars, rather than a normative dictionary. Meanings and concepts may be removed, changed and/or added in accordance with the need and purpose for each specific user.

Split Reality: Refers to our contemporary way of life and the division between many different tasks, relations and purposes. A phenomenon which is strongly present in the intertwined environment of working in a project-based organisation.
Split Attention: Derived from the concept of split reality, but focuses on the cognitive activities in the human brain trying to process large amounts of information from a large amount of senders that all demands attention. Split attention can therefore be said to be tightly coupled to the notion of computational complexity as presented by Grandori (2001), meaning numbers of things that the brain has to handle.

Attention Cost: A word used in the cognitive model of media choice to describe that the usage of a communication channel is always connected with an attention cost. The user of a high social presence media agrees to pay a high attention cost. The sender of a message in low social presence media can not be sure of what attention cost the receiver is prepared to pay. The attention cost is thus higher in media with high social presence than in those with low social presence. However the individual payoff for using high social presence media may often be higher, as presented in the Channel Choice Formula.

Channel Choice Formula: In order to be a preferred communication channel for sending a message the channel needs to fulfil the following: Individual advantage > Individual attention cost. The relation between advantage and attention cost can shift and thereby making a communication channel more favourable, for example when time is scarce.

Attention Budget: Attention budget is by us derived from the concept of bounded rationality and our empirical findings show that one can not do all, there is a limit and choices have to be made. The attention budget consists of both cognitive and emotional capacity and is predominantly allocated by the individual. The individual allocation process can be discussed as Individual Strategies.

Individual Strategies: In order to cope with the every day life in a project-based organisation, the study shows that rather sophistically designed individual strategies had been developed. The ways to handle the inbox, how to prioritise between tasks and how and where to search for information are examples of individual strategies to manage the every day work.
**Project Communication Tool**

The second part of the Project Communication framework consists of four blocks: *Tasks, Roles, Agreements* and *Structures*. The purpose of this tool is to serve as a departing point when searching to improve project communication. Situational tailoring may very well be needed to suit specific contexts. Nonetheless, the empirical findings show that a discussion around and a clarification of these four blocks was desired why it may prove to be a very useful activity to engage in. The four blocks will now be presented separately.

**Tasks**

The identification of the key tasks needed to be performed in a project is important since it removes uncertainty and directs attention to the actual tasks rather than the prioritising between them. The basic question to answer is what do we need to be good at in order to make this project successful?

**Roles**

The continuation of the above discussion is then of course who shall do what, which is my role and which is the role of others? Making this clear from the beginning saves attention and makes sure that all key tasks have an owner. If the roles are not clear individual strategies might direct work into an unwanted direction and some tasks might be left without an owner. For example, the *Translate and Promote* task is important when moving across knowledge boundaries towards outside stakeholders and if not time is allocated for doing this and/or the responsibility for who are to do it is not clear the project communication toward outside stakeholders may fail.

**Agreements**

It is our strong conviction that general and articulated agreements on how to communicate with each other helps to save the attention of the project members, by more efficient allocation of attention. These agreements are constructed in order to answer the question from above, how do we help each other save attention? The key things we suggest to bring up for discussion and to agree upon are the following:

*Share Individual Strategies*: The existence of individual strategies is fully understandable and a generally good thing, since we do not believe that structure can
compete in any way with the individual on this matter. However, as argued earlier they may become a problem and root for irritation and misunderstandings when becoming to diverse. We therefore suggest bringing them up the light in order to share tips and tricks on how to cope with every day work and to make sure that they do not operate in a sub optimizing manner.

**Mail Hygiene and Phone Norms:** This study shows that different approaches to the on and off button on the mobile phone may cause irritation, and so does the mistreatment of the CC function in outlook. Not only does it cause irritation, it also eats away attention that could be used for better things. Coming to terms with these issues is therefore a simple way of creating efficient attention allocation.

**Level of Summarisation:** In order to help each other save attention and thereby time, summarised communication can be a good thing to strive for. An agreement that states that the members of a project should try to help each other save time by summarising more is in our view a great way to both save attention and to create team spirit and respect. Respect for time and attention.

**Level of Translation:** When communicating with outside stakeholders whose logics and interest differ, information often needs to be translated in order to achieve the desired outcome. Discussing and bringing to light the logics of the stakeholders with an interest in the project may present the project with the opportunity to communicate more accurate and comprehensively.

**Structures**
Our case study showed that responsibilities had been rolled over to the individuals. The interviewees did for example put forward that tasks such as personal administration, time reporting and travel arrangements had increased over the last years. We argue that this contribute to the breaching of the individuals attention budget and may not realize the cost efficiency sought for. More over the study showed that individuals perceived their personal problem solving time to be to scarce. Simultaneously they wished for a wider and more comprehensive picture of the other knowledge areas and their progress, as well as they liked to display their own knowledge and progress to others. Below are three departure points for discussing the question: what structural support do we need in order to use our attention most effectively?
**Formal Meeting Structures:** For which purposes do we need which type of meeting? Are different types of meetings needed for different tasks, for example, coordination of activities and displaying of knowledge and progress may need different occasions? A meeting form that may serve as good for integrating knowledge areas whilst creating a joint ownership of problems are standing meetings (Lindkvist et al, 2001). This meeting form is formal in the respect that it is regularly held but conducted in an informal manner where the participants stands and shortly briefs each other on the current situation looking at a project charter. To consider different forms of meetings, based on the projects needs, might prove useful.

**Informal Meeting Structures:** This case study has shown the importance of informal networks. It has also shown that the physical seating in this case enhanced the possibility to make use of the informal network. The possibility to give and get taps on the shoulder was at the same time positive and negative. A discussion of how the informal meetings are best supported and conducted is a way to leverage the positive effects of the informal networks whilst removing its downsides.

**Swap:** One way of rolling back some of the responsibilities given to the individuals to the structure are to make a swap. The idea of a swap is to roll back responsibilities of the individual to the structure in order to save attention cost for the individual but still keep the flexibility of the project-based organisation. However, one must be careful not to swap away this flexibility and create hindering structures.

An example of a swap is the time swap, and we will now give an example on how it can be constructed: each project member puts in time to attend a regularly project standing meeting where progress can be displayed and problems brought up and discussed over knowledge boundaries. In exchange for this invested individual time the individuals receive four hours that can be used for individual problem solving. These four hours, occurring at the same time for all project members, would then be unbookable in the outlook calendar. This means that for example every Tuesday morning is set aside and can not be booked. This is proposed based on the following background:
People are now booking themselves in the outlook calendar, making it even harder to arrange for meetings. A behaviour that is understandable, but has negative implications for the organisation.

Interviews shows that an increased awareness of the progress of the other subprojects is desired, both for motivational and problem solving aspects.

The attention budget is reached and some measures needs to be taken.

A time swap therefore seams like a good and realistic option to pursue, since it has little or no cost effect, it is not harming the competitiveness of the organisation; it presents individuals with more individual problem solving time at the same time as it increases the awareness of the other subprojects. Moreover it can be remove some of the emerging trend of individual strategies that is harmful to the organisation. The time swap is illustrated in Figure 19.

![Time Swap Diagram](own model)

Other swaps that could be discussed are channel swaps and knowledge swaps. The channel swap is based on the background that individuals believe that face-to-face communication is a superior channel both for problem solving and for generating team spirit and energy and that e-mail is a great tool in many aspects, but that it sometimes is
overused. A discussion on what’s done best by face to-face and what’s done best by e-mail, and by other channels for that matter, may very well be fruitful and could allocate attention more effectively.

The knowledge swap is based on the empirical findings that administrative tasks such as booking journeys etcetera is taking up a lot of time for the members in the case study. The aim of the knowledge swap is to use comparative advantages in knowledge by matching knowledge to task more accurately. This would be done through relieving project members from the some of the personal administration tasks they are performing today, and veiling them back to supporting structures.

The essence of the analysis, the conclusions drawn from this study, will now be presented in the last section of this report.
VI CONCLUSIONS

In this final part we will present the conclusions drawn from this study. The research questions will be answered and theoretical and practical contributions will be presented. The chapter is concluded with recommendations for further research.

Introduction

This study set out to explore individuals’ usage of different communications channels and the reasons for using them. Moreover it was the objective to understand this behaviour in a project-based organisation and to see what practical implications it could have for managers, project members and future scholars active in the field of project-based organisations. In this chapter we will first present theoretical conclusions regarding the individual use of communication channels followed by conclusions regarding the practical implications for managing project communication. Finally we will present questions and ideas left for other researchers to explore.

Theoretical Contributions

The choice of communication channel were not deliberately made by the project members but rather said to be directed by routine, experience or “gut feeling”. The project members had also developed more or less deliberate strategies in order to handle both communication and the daily activities as which tasks to perform and how much time to spend on each. We have mapped the usage of different channels and in order to understand reasons for choosing channels we analysed the findings with help from theories on media choice.

We found overall support for both the media richness theory proposed by Kock (2004; 2005) and the media richness theory proposed by Robert and Dennis (2005). However we also found that these theories do not fully manage to explain the choice of communication channels in the specific setting of a project-based organisation. Therefore we proposed a revised version of the paradox presented by Robert and Dennis (2005). They argue that the ability to process a message increase when using low social presence media but we found that this does not seem to be valid in project-based organisations where time is limited and computer mediated systems, in this case intranet and project home page, did not have the ability to carry enough contextual information to make the information meaningful to its users which would lead to increased ability to
process. Furthermore, in this specific case the trust in these tools as reliable sources of information was low. This shifted the relative attention cost between high and low social presence media in advantage for high social presence media.

The findings regarding the intranet and project home page shows that that individuals turned to informal networks and face-to-face interactions to find information rather than using IT tools as the intranet and project home pages, this supports earlier findings made by Bresnen et al (2003) and Brown and Duguid (1998). Informal networks as a way to gather information was not only viewed as faster but also more reliable and accurate.

Arguably, this information searching behaviour can be viewed as a sign that it is still only human beings that can extract and conclude information without loosing the contextual base which makes the information meaningful. When time is a limited resource the possibilities to get hold of concluded and validated information with contextual bits of information attached to it is extremely valuable. As long as computer mediated tools used in project-based organisations are not able to provide this kind of information the informal networks will be the main source of reliable information.

The usage of e-mail was not fully explained by existing media choice theories, why we suggested four features that can explain why e-mail should be viewed as more than a communication channel. These four features were: e-mail as a individual memory storage, e-mail as a documentary archive, e-mail as a catalyst of tacit knowledge and e-mail as an asynchronically but always present work companion.

The preferences for face-to-face interaction both for validating information and for problem solving were strong. In opposition to the theory presented by Robert and Dennis (2005) it seemed like face-to-face was not viewed as disturbing and did not lower ability. Rather it was viewed as crucial for problem solving. The problem solving interaction was foremost conducted by informal meetings and interactions, where there were fewer participants and those who were present were selected and knew each other fairly well. Consequently, the theory may still be valid when the number of participants increase and/or the level of common knowledge drop. The theories revised treats face-to-face interaction in a clustered manner whereas we suggest that there are different
types of face-to-face interactions and that it would add explanation value to distinguish the different types and study their different logics separately.

We put forward a channel choice formula where the individual gain of a media had to exceed the attention cost in order to be preferred. This individual gain came in possibilities to save time and uncertainty. The relation between the individual’s gain and cost could shift due to changed circumstances, for example phone was not a generally preferred communication channel, but when time was scarce it found its use as an accelerator of action and an effective way of taking the receivers attention rather than waiting to get it. The *taking* of rather than waiting to *get* attention from the receiver seemed to be leveraged by time scarcity. Since the motivation was very high we argue that this behaviour had not been developed in order to avoid effortful thinking but rather to save attention when that was of shortage.

When comparing netmeeting and video conference it was viewed as more important to see pictures, graphs and diagrams than to physically see each other on a screen. Video conference is according to Kock (2004; 2005) higher in naturalness and should thereby imply decreased cognitive effort and communication ambiguity; this did however not seem to be the case. The pictures, graphs and diagrams seemed to compensate for more than what was lost in media naturalness.

**Practical Contributions**

This study has increased the understanding on how communication channels are used by project members in a project-based context. Furthermore the study has provided insights on the daily work conducted in a project-based organisation including knowledge areas, tasks and roles, the foundation for cooperation and different stakeholders. The understandings of the individuals’ actions and the insights of the context surrounding them led us to develop the concept of attention budget, showing that the battle of resources in a project-based organisation is a battle of the attention and energy of its members.

In order to discuss and actively manage the attention budgets of the individuals in a project-based organisation, we proposed a *Project Communication Framework*, see Figure 20. The framework is to be seen as a starting point and a support for project-
based organisations in the search for more effective communication and more efficient use of the individuals’ attention budgets.

This framework is built through reproduction of the reality based on an thorough empirical ground, inspired by Brunssons (1982) ideas of cultivation of language as a goal for business researchers. We believe that this framework can be useful for project managers and members at TPCA when addressing the issue of project communication. In addition to this, we hope that other practitioners and scholars in the field of project management will find this framework to be a useful and flexible tool for discussing project communication. We believe that this will be the case since the framework is constructed in a manner that enables different users to adapt the framework to their specific organisational setting.
Future Research
We believe that the findings presented in this study has added new insights and we hope that they will encourage further endeavours to make knowledge work more productive. We would like to conclude this report with some suggestions for future research in the field of communication in project-based organisations.

When rigid structures are neither present nor wanted, is it so that communication agreements and structures can be the glue that holds project-based organisations together? Can structural support based on individuals’ communication behaviour help organisations in supporting the bounded rationality of individuals in order to avoid breaching the attention budget? Based on this study we propose that the answer to these questions are yes, and leaves it as a hypothesis to investigate for future scholars.

We suggest that closer attention is paid to how problems get their solution by face-to-face interaction by a more distinct division of face-to-face interaction, since today’s theoretical clustering of face-to-face interaction as one media is too inexact for explaining the complex process of joint problem solving.

Finally, it would be of interest to investigate whether the theoretical and practical contributions put forward by this study could prove useful also in other organisational contexts than the context of a project-based organisation.
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Tetra Pak in figures 2005

Tetra Pak – protects what’s good

**Interviews**

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<td>2nd February 2006</td>
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<tr>
<td>Per Ciwesson</td>
<td>Senior Management TPCA</td>
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<td>Javier Maria</td>
<td>Project Manager GCC Project</td>
<td>15th February 2006</td>
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<td>Frida Östergren</td>
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<td>15th February 2006</td>
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<td>Fredrik Eriksson</td>
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<td>Bengt Åkesson</td>
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<td>Susanne Palmquist</td>
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<td>Bengt-Åke Olofsson</td>
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<td>Benedicto Penteado</td>
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<td>Olle Fridolf</td>
<td>Project Member CSL Project</td>
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<td>Björn H:son Linde</td>
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<tr>
<td>Jonas Håkansson</td>
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<td>Linda Paulsson</td>
<td>Communications Director</td>
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<tr>
<td>Jan Esbjörnsson</td>
<td>Project Manager CSL project</td>
<td>29th March 2006</td>
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</table>
APPENDIX 1
Schedule for empirical data gathering & presentation TPCA Lund

- **First Visit 2\textsuperscript{nd} February 2006**

  Meeting/Interview with representatives from senior management:
  
  Connie Kristensson, Vice President, Industrialisation and Packaging Manufacturing Technology
  Per Ciewsson, Global Process Driver, Commercial Launch & Product Removal, TQM Manager, Packaging Manufacturing Technology

- **Second Visit 15\textsuperscript{th} February 2006**

  Interviews with Project representatives from two projects
  
  Jan Esbjörnsson, Project Manager, CSL Project TBA
  
  Javier Maria Gomez Plata, Project Manager GCC Project
  Frida Östergren, Project Representative GCC Project

  Interview with Communications Director
  Linda Paulsson, Communications Director

- **Third Visit 15\textsuperscript{th} March 2006**

  Interview with Project Manager
  Jan Esbjörnsson, Project Manager, CSL Project TBA

- **Fourth visit 20\textsuperscript{th}-24\textsuperscript{th} and 27\textsuperscript{th}-29\textsuperscript{th} March 2006**

  **20\textsuperscript{th} March**
  Interviews with project members:
  Fredrik Eriksson
  Rolf Lasson
  Laurent Leloup

  **21\textsuperscript{th} March**
  Interviews with project members:
  Anders Olsson
  Roger Billström
  Bengt Åkesson
  Susanne Palmquist
  Stephane Aymonier
22nd and 23rd March
Observations at the Kick-off

Interview with Orderer: Bengt-Åke Olofsson, Orderer Converting Standard Line Project (2006-03-21)

24th March
Interviews with project members Benedicto Penteado Olle Fridolf

Observation of weekly project meeting

27th March
Interview with project member: Björn H:son Linde

28th March
Interview with project member: Jonas Håkansson

Guided tour in the converting factory in Lund

29th March
Observation of netmeeting with the test factories

Interview Linda Paulsson, Communications Director

Summarising interview Jan Esbjörnsson

• Fifth visit to TPCA 16th June 2006

Presentation of the results
Background for Interview Meetings at TPCA
- Lund 15 of February 2006 -

<table>
<thead>
<tr>
<th>TPCA</th>
<th>Linköping University</th>
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<tbody>
<tr>
<td>11.30-13.00  JavierMaria Gomez Plata, Project Manager</td>
<td>Lars Lindkvist</td>
</tr>
<tr>
<td>13.00-15.00  Jan Esbjörnsson, Project Manager</td>
<td>Jens Nilsson</td>
</tr>
<tr>
<td>15.30-        Linda Paulsson, Communications Director</td>
<td>Frida Börjesson</td>
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</tbody>
</table>

Conference Room 308: Nobel

**Purpose of the Study:**
We are now in the last phase of our Masters Programme at Linköping School of Management, Linköping University. Our last semester consists of a 20 week long research study, which we have been given the opportunity to conduct with you at TPCA in Lund. Our research interest is project management, knowledge management with a focus on communication in projects. The reason for this interest is the ongoing debate, both in the academic world and in organisations world wide, on how to coordinate communication in order to manage knowledge and information in projects.

Our hope is that we through this study will be able to contribute to the field of project management with findings that will be useful for both future research as well as for TPCA.

**Purpose of the Interviews:**
Our main objective with these interviews is to get a broad picture and understanding of your projects and your business. Through open discussions with you we hope to be able to map and pinpoint the best ways to conduct the study.

**Topics for Discussion:**
- The purpose and context of the projects
- The members of the projects
- Process orientation and project management
- Project coordination and project communication
- Other areas of interest
- Outlines and time schedule for interviews and observations

Best Regards/
Frida Börjesson & Jens Nilsson, Linköping 12th February 2006
APPENDIX 3
Opening statement - interviewees and participants in kick-off

Project Communication Study
Converting Standard Line Project –TBA
Spring 2006

Sponsored by:
Connie Kristensson
Vice President,
Industrialisation and Packaging Manufacturing Technology

Per Ciwesson
Global Process Driver, Commercial Launch & Product Removal, TQM Manager
Packaging Manufacturing Technology

Jan Esbjörnsson
Project Manager
Converting Standard Line Project TBA
Packaging Manufacturing Technology

Conducted by:
Frida Börjesson & Jens Nilsson
Students at Masters Programme
Department of Management and Economics
Linköping University

Tutored by:
Lars Lindkvist
Professor of Business Administration
Department of Management and Economics
Linköping University

Purpose
- Map communication patterns and information needs within the Converting Standard Line Project –TBA
- Present a background for future work to improve project communication structures at TPCA
- Contribute to the theoretical field of project management by adding new perspectives on project communication

Research Questions
What needs for information are present, who communicates with whom, how is the communication conducted, what is communicated, when is it communicated?

Furthermore, what different roles are present and what kind of information and knowledge transfer is needed on different levels and for different purposes?

Method
- Interviews with the project manager and project members
• Observations of the work conducted in the project, for example meeting observations. The researchers will also spend time at the TPCA site in Lund observing regular day communication and participate in Project Kick-off in order to better understand the project and the communication patterns
• Mini-survey on time consumption and channels used for communication in the project

Presentation of results
The results will be presented in a Master Thesis and seminar presentation at Linköping University in June 2006 and in a presentation at TPCA Lund.

A confidentiality agreement has been signed and TPCA representatives will review and approve the results before presented at Linköping University.

Interview guidelines
• Interviews will be conducted with members of the Converting Standard Line Project –TBA at TPCA Lund in March and April 2006
• The duration of the interviews will be 1-1,5 hours
• The goal is to develop a comprehensive understanding of both structural and individual patterns of communication

Interview Topics
• Individual communication behaviour and preferences
• Individual knowledge areas and information needs
• Standardized routines within TPCA projects
• Collaboration and coordination within the Converting Standard Line Project
• Tasks and deadlines
• Available channels and tools for communication
Interview guide to project members

- Interview Guide-

Name: ______________________________________________
Date:________________________________________________
Where:______________________________________________
Mp3 file nr:___________________________________________

Background:
How many years at Tetra Pak / TPCA:_______________________
How many projects do you participate in:_____________________
Time allocated for Converting Standard Line Project:__________
Area of responsibility:____________________________________
Knowledge area and competences:__________________________

Questions
Can you tell us about the role in the Converting Standard Line Project?
  • How was your participation decided?
  • How does the contract between you and the project look like?
  •
Can you explain what this implies in the practical work?
  • How does a typical day look like?
  • How does a typical week look like?
  • Different types of tasks

What characterizes your work tasks?
  • Routines and repetational tasks
  • Complex and unique problems
  •
How are your work tasks coupled to deadlines?

What kind of cooperation, problem solving and/or coordinating will be necessary during the project?

Do you think that you work differently in different parts, different knowledge areas of the project?
Within and without the project.

How is your time divided between working alone and working with others?

Have you then counted the time for communication, both for sending and receiving?
  • Is the picture different if you do?

How long time periods without interruption do you appreciate that you have to work individually?
  • Is it enough, too much or too little?

→ Can you conclude this as...
→ Have I got you right if I interpret you like this...

How do you cooperate within your knowledge area in the project?

How do you cooperate with the other knowledge areas in the project?

Do you cooperate in a similar way also in other projects?

What needs is directing your cooperation?

What is according to you the purpose of this cooperation, problem solving, coordinating or social purposes?
  • Common problem solving
  • Coordination of different individuals or knowledge areas contribution of knowledge
  • Socialisation and getting the whole picture
  • More / Others?

What factors do you view as essential for the ability to cooperate with others?

What factors do you view as hindering the cooperation with others?
(eg)
  • Time
  • Culture
  • Personality
  • Hierarchy

→ Can you conclude this as...
→ Have I got you right if I interpret you like this...
What role does communication play in cooperating?
- In different phases of a project
- Between different individuals and levels
- Between different projects

What communication channels are available to enable cooperation?
(Eg):
- Meeting
- Standing meeting
- Informal meetings
- Telephone
- Telephone conference
- Video conference
- E-mail
- Netmeeting
- Intranet
- News letter
- Project home page
- SMS
- Others?

Which of these channels do you use?
- Why?
- Advantages and disadvantages with these channels?

Do you use different channels for different tasks and different purposes; problem solving, coordinating or social?
- (Same as above)
- Common problem solving
- Coordination of different individuals or knowledge areas contribution of knowledge
- Socialisation and getting the whole picture
- More / Others?

Do you use different channels to communicate the same message to different people?
- Within my knowledge area
- Within the project
- With other people at TPCA
- With the factory
How do you prefer to get things communicated to you?
- What is directing your preferences?
- What is directing your motivation to absorb information?
- What information needs do you have in order to solve your tasks?

How do you prefer to communicate information to others?
- What is directing your preferences?
- Eg: time, complexity, receiver, other?

Would you describe your choices as deliberate or routine based?
- What is deciding what channel to use?
- Is there any explicit guide lines for how communication should be conducted?
- Are there tacit norms or standards for how communication should be conducted?

Do you think that there are limits in how communication can be made more effective? If so, in what is the delimitation?

Can you conclude this as...
Have I got you right if I interpret you like this...

What do you do if you need information but so not know where it is or whom can know it?

How do you think time is affecting how you handle information and how you communicate with others?

Do you think that you have enough knowledge to absorb information that is communicated from different parts in the project?

What is, according to you, the goal of the Converting Standard Line Project?
- Is it a realistic goal?

What is your contribution to fulfilment of the project goal?
- What is crucial for you to succeed with this?
- What do you need to know in order to solve your tasks?

What in the project start-up do you consider as crucial for a successful project?
How well do you know each other in the project?
  - How well do you usually know each other in projects at TPCA?

What, according to you, is characterizing an well functioning project communication?
  - In an optimal situation, how should it function?

Are there any needs for additional channels or tools to facilitate and effectivise the project communication?
  - What demands would you pose on such a tool?

Questions regarding the kick-off the 22-23 of March

Before the Kick-off
What do you expect from the kick-off?

Have you been at any kick-off before and in that case, what did you think of it?

After the Kick-off
What did you think of the kick-off?
  - What was good?
  - What can be better?

What actual effects do you think that the kick-off had?
  - For your motivation
  - For your daily work?
  - For the communication in the project
  - For coordination and/or cooperation
  - To the fulfilment of the project goals

What is, according to you, the goal of the Converting Standard Line Project?
  - Is it a realistic goal?

What is your contribution to fulfilment of the project goal?
  - What is crucial for you to succeed with this?
  - What do you need to know in order to solve your tasks?

Did the kick-off create new informal contacts that you think will help you in your work?

What, according to you, is characterizing an well functioning project communication?
  - In an optimal situation, how should it function?
Are there any needs for additional channels or tools to facilitate and effectivise the project communication?
  • What demands would you pose on such a tool?

Do you have anything to add? / Other comments?
Project Map:

- Map over the different parts and knowledge areas of the project
- Your position
- Couplings and Communication routes, formal/informal
- Channels for communication
APPENDIX 5
Interview guide regarding the role as project manager

- Interview Guide -

Questions focusing on the role as a project manager

What standardised routines are there to run projects in TPCA?

Have you planned additional / other routines?

What is your opinion on the need of communication support?
- Intranet, project home page etcetera

How many different knowledge areas is there in the Standard Line Project?

What level of cooperation and coordination will be necessary during the project?

How has the project members been selected?

How does the contract between the project and the project members look like?

How strong motivation do you think that the project members have for the Converting Standard Line project?

How homogenous is the group that is in the project?
- Background, age, gender, number of years employed etcetera.

How do you plan that communication will be conducted in the project?
- Are these plans optimal or did you have to forgo some of your wishes?
APPENDIX 6
Observation guide

- Observation Guide –

Content:

1. **Observations made during the interviews**
   - Attitude of the interviewee
   - Interruptions
   - Other

2. **Observations made during project meeting**
   - The purpose of the meeting – problem solving or coordination
   - Atmosphere and activity
   - Interaction between knowledge areas
   - How is decisions made – consensus or not
   - Plans for further discussions after the meeting – through which channel?
   - Other

3. **Observations made during the Kick-off**

4. **Observations made in the open office space and at the coffee machine**
   - Informal meetings
   - Other
1. **Observations made during the interviews**
   - Attitude of the interviewee
   - Interruptions
   - Other

Observation: _____________________________________________________________

_______________________________________________________

Context: __________________________________________________________________

Who: _____________________________________________________________________

When: __________ Where: __________ How: __________

Own thoughts/comments: ________________________________________________

2. **Observations made during project meeting**
   - The purpose of the meeting – problem solving or coordination
   - Atmosphere and activity

   - Interaction between knowledge areas
   - How is decisions made – consensus or not
   - Plans for further discussions after the meeting – through which channel?
   - Other

Observation: _____________________________________________________________

_______________________________________________________

Context: __________________________________________________________________

Who: _____________________________________________________________________

When: __________ Where: __________ How: __________

Own thoughts/comments: ________________________________________________
3. Observations made during the Kick-off

Observation:_____________________________________________________

Context:________________________________________________________

Who:__________________________________________________________

When:_____________Where:______________How:____________

Own thoughts/comments:__________________________________________

4. Observations made in the open office space and at the coffee machine

• Informal meetings
• Problem solving, coordinating or social meetings
• Other

Observation:_____________________________________________________

Context:________________________________________________________

Who:__________________________________________________________

When:_____________Where:______________How:____________

Own thoughts/comments:__________________________________________