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Communication Support Systems

Managing the fitness between contextual factors and communication media factors

ABSTRACT

This study investigates the factors that are crucial for successful communication and hence to the design of Communication Support Systems (CSS). The study focuses on the concept of media richness and attempts to improve our understanding of the factors that influences the fitness between organizational context and the use of communication technology. Thus, the enterprise of mine study has been delineated and focused on the following question: What factors are responsible for successful fit between the communication mediums characteristics and an organizations communicational character?
The following three statements represent a sound rather than conclusive answer to the investigated issue.

- Firstly, the success of communication depends on the fitness between organizational related factors and communication media related factors. Accordingly, the fitness is expressed in terms of a matching between required richness and provided richness.
- Secondly, the fitness between organizational related factors and communication media related factors depends on human factors such as task experience and communication media experience.
- Thirdly, the fitness between organizational related factors and communication media related factors depends on human perceived uncertainty rather than task uncertainty as the classical information richness theory presupposes.

A case study in the context of a higher school was chosen to be investigated where students teachers, and staff were interviewed with respect to the use of information and communication support.

Key words: Communication Support Systems, Task fitness, Media richness, CMC

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Master Thesis

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~Nikolai Novikov

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Introduction

Communication is vital for the functioning of any organization. Communication is the process of establishing shared understanding between people through the sound exchange of information. Typically information is exchanged in a face to face mode. However information technology can support other modes of communication. Information and energy can be seen as the two primal engines for our society and our organizations. We need energy to do work but we need information to know when or what to do. Managers have been found to spend between 40 and 90 percent of their time communicating (Mintzberg 1973) and technical/professional employees spend on average 63% of their time communicating (Montgomery and Benbasat 1983). With growth in size and complexity of organizations communication plays an ever more important role in it's productivity. In parallel with growth in demands for communication systems computer technology has been utilized to make communication processing more efficient.

Information and communication technologies have now undoubtedly become an integral part of our society. They are considered to be a prime tool for administrative information processing and as such have been developed and fine-tuned for several decades to reach the maximum effect. However there are doubts concerning just how helpful this new technologies are.

In the end of 1980s /beginning of 1990s a series of empirical research suggested that whereas the investment into IT is rising the productivity increase is steadily falling.
"Delivered computing power in the U.S. economy has increased by more than two orders of magnitude since 1970 yet productivity; especially in the service sector, seems to have stagnated" (Erik Brynjolfsson 1993).

Needless to say this is an alarming paradox and improvement in understanding of the fitness between the communication needs of an organization and the characteristics the communication media, could be of great importance for the design and management of organizations in general and the communication support systems in particular.

The information flow in organizations increases as measured both in information volumes and ways to channel information. However, in many cases the uncertainties faced by the organization are not absorbed. Communication in general and IT-based communication in particular remains an unexplored dark continent.

I have been given an opportunity by one such school "Schillerska gymnasium" to study their communication system which was believed to be malfunctioning.

The factor of growth and importance of new types of communication is important in education of children as school is meant to prepare them for the new challenges. To this end schools are attempting to modify their communication systems in order to better fit the realities of today.

Purpose and Problem definition

This study deals with the design, use and management of communication support systems. The concept of Communication Support System (CSS) is preliminary defined here as a system that provides communication support to groups of people that are engaged in common tasks or are sharing common resources, goals, values, etc. In this sense the CSS become an interface to a shared human environment.

Purpose of the study

The purpose of this inquiry is to identify and understand **the factors that promote the use and success respectively hamper and obstruct of communication support systems (CSS).** Improved understanding of these factors will hopefully lead to development of more robust CSS system, which is essential for improved management of organization.

Problem definition

With respect to the stated purpose of the study this inquiry tries to clarify the following issue:

> What factors are responsible for successful fit between the communication mediums characteristics and an organizations communicational character ?

In the first place the study refers to the communication mediums characteristics, i.e. factors such as information paradox, information overload, communication media parameters, etc.
In the second place the study concerns an organizations communicational characteristics that are given in terms of structure, culture, tasks, technology, people capabilities, etc.
Lastly in the third place the study deals with the fitness or matching between the communicational respective organizational characteristics

Disposition

Next chapter outlines the underlying method of inquiry as well as considerations for quality control in terms of validity and reliability.

Chapter three presents the theoretical views on the issues, design ideas and management philosophies concerning the phenomenon of communication as well as attempts to design sound communication support systems.

Chapter four presents a conceptual model that aims to provide a systematic syntasis of the theoretical views of the previous chapter. Accordingly queries for investigation are derived from the model. With other words a theory of a certain phenomena is given in terms of a model consisting of two parts: the grounding statements and the derived statements. Accordingly the grounding statements represent the theoretical views underlying the investigation whereas derived statements are represented in terms of queries.

Chapter five presents the empirical results of investigation whereas chapter six provides an interpretation of both similarities and differences between the conceptual and empirical views.

Lastly chapter seven provides a summary of conclusions responding to the problem statement of the study. Furthermore cases for further investigation are outlined.

Method of inquiry

There is need of a method for finding out the truth. (Rule IV.)
~Descartes

Approach

In my studies I have used the following approach suggested by my supervisor Thanos Magoulas.

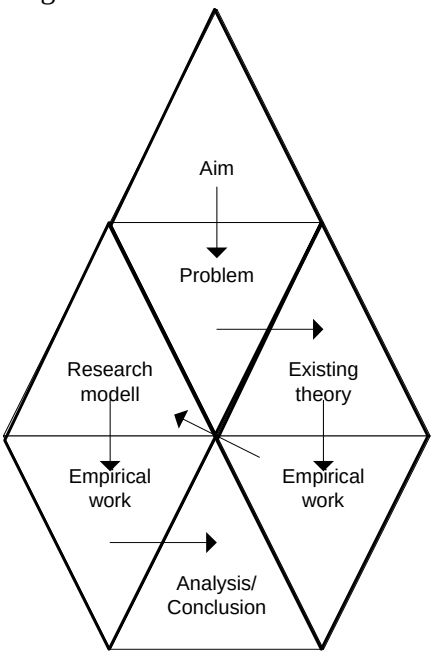

Figure 1 Determining Aim/Problem of the study

In order to reach a certain result it is important to understand what that result is. Information technology use should not be a goal in itself, but rather one (of many) tools aiding in management problem of improving functionality in organization. So in course of this study I wasn't looking for ways in which information technology can be used for communication improvement, but rather in what ways present technologies fail to fulfill the needs of organization and reasons behind this failures.

Study of existing theories and their empirical and conceptual support

In order to understand how the communication needs of an organization and the capabilities of **information and communication technologies** function together I have studied an existing body of theoretical works that I thought could be relevant to the case at hand.

Creating a model to match the problem statement

Based on existing theories (and empirical findings from those researchers who tested them in the past) I have formulated my research model of how communication system is used for interaction inside the organization and what factors may affect the performance of the organization.

Empirical work
I have carried out empirical research that was meant to verify the reliability of my model. In any case the empirical result has been organized in terms of tables according to Backman suggestions.

Analysis
Interpretation of the harmony/disharmony (similarities and differences) between the conceptual model and empirical views.

Conclusion
Drawing conclusions in order to provide a sound solution to the problem statement.

Scientific framework

Hermeneutics vs. Positivism

When choosing methodology it is important to establish what sort of scientific approach is taken. It is possible to distinguish two principal schools of thought in this matter: positivistic and hermeneutic.

Positivism school originates from natural sciences and states that phenomena can be perceived objectively whereas hermeneutic believes that any observation is subjective. Positivism assumes that a whole is a sum of parts and it is thus possible to completely isolate and study the phenomena under fully controlled conditions. The researcher is considered to be "outside" the experiment and not affecting the outcome in any way.

Hermeneutic school, which arose as social sciences answer to positivism, adopts a more holistic point of view. Everything is interconnected and it is naïve to believe that it is possible to track and isolate every connection to the outside world that an object has. If that in fact proves possible than certain properties of an object will be lost as the whole is greater than parts. Even researcher is considered to be a part of the phenomena environment and hence affecting the outcome of the study. Moreover hermeneutics state that it is impossible to learn the absolute reality but rather only individual's subjective interpretation of reality. Therefore when study concerns humans (as it is the case here) it is important to understand studied persons motivation and point of view on the matter in order to compensate for that subjectivity.

Traditionally positivist school uses quantitative methods of research while hermeneutic prefers qualitative.

The description given here are that of extremes but in practice most often a combination of both is used

For the study I have chosen hermeneutic approach, since I believed that as users perception of technology is bound to be subjective it is best to admit from the start that total objectivity in this case is unachievable.

Information Gathering

Qualitative vs. Quantitative methods

For gathering data it is possible to use either qualitative or quantitative methods.

Quantitative methods as the name suggests are designed to gather numerical and various statistical information. Examples include direct measurements of parameters that are of interest or indirect i.e. different forms of questionnaires. A large advantage of such methodologies is ability to process and, which is even more important analyze massive amounts of data. Downside is that wile quantitative method may collect data about frequency of certain phenomena occurrence or different phenomena parameters it might be unable to assist in understanding the nature of this phenomena since the questions are very narrowly specialized and (out of hermeneutic point of view) unable to embrace the complexity of the real world. Out of plethora of possible connections quantitative methodology is capable to concentrate only on few that were essentially predefined before the research is carried out, which damages the methods validity Easterby-Smith (1991).

Qualitative methods (interviews, document analysis, observation), on the other hand, allow in-depth study of the phenomena. While perhaps unable to compile data about enough cases to serve as ground for statistically significant conclusions qualitative methods allow for better understanding of the cases that do get examined. Important difference from the quantitative approach is that qualitative methods are more open-ended. While quantitative methods only allow establishing significance of parameters pre-established by the researcher qualitative allow for discovery of new parameters. This makes qualitative methodology considerably more flexible than quantitative – researcher becomes capable to affect the validity of the study by introducing modifications in accordance with information that is already received. Finally it can be argued that with qualitative methods it is simply easier to establish understanding with the respondents and avoid misunderstandings that could be disastrous with quantitative counterparts. Two main drawbacks of qualitative methods are the abovementioned small research base as well as concern for their (methodologies) subjectivity – being more “rich” in information content results of qualitative methodology are strongly dependant on the researcher interpretation and hence their reliability suffers.

Since I have adopted hermeneutic approach for this study it seemed appropriate to use qualitative methodology that allows to capture “the whole picture”. Issue of validity has been especially acute since being a relative stranger to this area I had problems establishing what parameters I should be looking at. However once (using qualitative methodology) I have established certain parameters that could be expressed in quantifiable form I intended to produce a quantitative study in order to achieve higher level of objectivity and reliability.

Literature studies

In accordance with Backman it is possible to distinguish three principal search methods, or rather phases as they are meant to compliment each other. The phases are consultation, manual search and database search. In practice manual search nowadays is often computerized

and resource databases even often utilities to assist in it (literature cross-referencing for example)

Initially my supervisor suggested a number of articles and other literature that could be relevant to my study (consultation phase). I have then followed down references from pieces that seemed interesting to me to gain a deeper perspective in those areas, as well as searched for works that are referencing the piece I was reading, which helped to find fresher articles and different viewpoints on the same subject ("manual" search). Finally I used keywords from most useful works in order to further refine my search (database search[1]).

Interviews

Interviews can be seen as conversation with a purpose, where purpose is to gather information (Merriam, 1998). The interviewer asking questions to the interviewee guides this conversation. According to Merriam interviews can be ordered according to how strict the guidance is in to continuum from strongly-structured to unstructured with semi-structured in between. Strongly structured interviews can be seen essentially as a questionnaire that is read out to the interviewee whereas in unstructured the interviewers guiding role is reduced to the minimum of most general questions. Semi structured interviews assume that interviewer uses a certain list of questions for guidance but is free to change the wording of questions, order in which they ask and even add new questions depending on the situation. In my study I have balanced somewhere between unstructured and semi-structured interviews – initially the interviews were more unstructured but as I gained understanding of the subject I managed to develop certain guidelines for the interview which allowed me to ask questions that were specifically interesting for my research rather than being carried away into less relevant subjects.

During the course of the study 12 people were interviews using in a semi-structured fashion. Among them were representatives from school management, administration, teachers and students. Each interview took approximately an hour to complete.

Survey

During the interviews/literature studies I have managed to identify certain quantifiable parameters that I believed to be of relevance to my study. As qualitative methods allowed questioning a relatively small contingent of people I decided to employ quantitative methodology, namely survey.

A side mission of the survey has been to test some premises that I distilled from the interviews, namely that schools e-mail communication system is nearly abandoned. So first I have sent out survey in electronic form to all teachers and students (those were two different surveys as I believe students and teachers see different aspects of the communication process).

[1] Article databases I used were:

Emerald	http://oberon.emeraldinsight.com
ScienceDirect	http://www.sciencedirect.com
ACM portal	http://portal.acm.org
Jstor	http://www.jstor.org/

Plus some general search for authors, titles and keywords/phrases using Google search engine (http://google.se).

Unfortunately the response has been dramatically low (although it was higher among teachers than among students). I then carried out a “pen and paper” survey among students. Still due to time and resource limitations the scale of survey was quite small (being unable to automate the survey results collection and analysis process made this method practically as effort-intense interviewing). On a side note the size of questionnaire (4 pages) was too large for my purposes as a lot of students refused to spent the time needed to fill it out.

Observations

Some basic observations have been made of students use for communication medias that were publicly available. It was opted not to do participatory work since presence of an external person would disrupt both the education process and the pattern of communications use and I lacked the time and experience to attempt to “blend in” into this very specific environment.

Research in practice

I have initially made some literature studies in the area to see what possible reasons for malfunction have been suggested. In parallel some unstructured interviews with administrative staff were made to further precise my literature search.

Then as more information was gained It was decided to deepen and narrow the interviews and semi-structured interviews were made with some of teachers suggested by vice-principles (I believed that it is important to get teachers with diverse background regarding the subject they teach, their time at school and grade they are class-teachers for, but being a stranger at school I had to rely on vice-principals judgment in identifying this people). However teachers were contacted independently of the school command structure – i.e. directly and not via their respective vice-principal. Students that participated in interviews were picked out at random with exception of student council member who was suggested by student assistant as a rather active student representative. This period (in which interviews been made) has taken about a month.

After interviews were conducted I felt that it would be positive to use a quantitative method in order to gain more reliability for my work. At the same time it was an opportunity to use schools communication system in order to see how it works. A link to on-line questionnaire was sent to all students however only a dozen students (out of potential 900+) responded. I have then taken to pen-and paper approach but it proved to be very labor-intense, though it gave a higher response rate and I got another dozen replies (out of 25 that were handed out). When making a similar survey for the teachers I have taken experience with student survey into account and taken away some questions so the survey became both easier for teachers to fill and for me to transfer into computer form.

Although survey has not given me the reliability I was aiming for it’s side-quest of checking whether communication works has in my opinion succeeded since it has confirmed opinion expressed in interviews that overall use of school e-mail is low but higher among teachers then among students. Even if the issue with low response has been in part due to bad question format or survey size such response rate among students when approached via e-mail seems abnormally low.

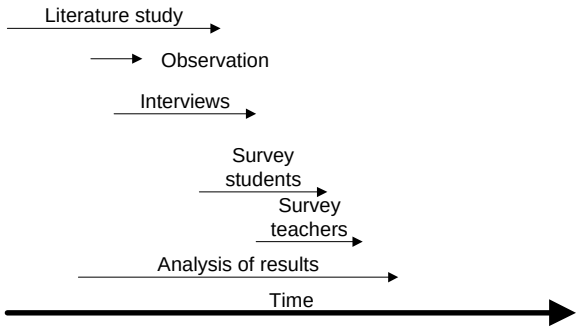

Figure 2 work timeline

Rough order in which different parts of work were carried out.

Validity & Reliability

Validity and reliability are to ways to evaluate a study. Validity evaluates whether the study is really looking at those issues it claims to, i.e. whether repetition of study would give the same results. Reliability evaluates whether study is based on good empirical grounds. [2]

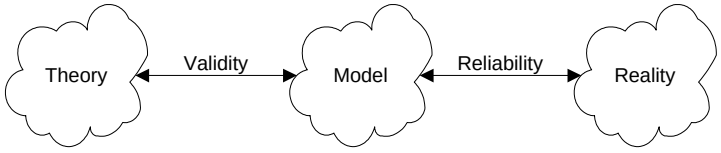

Figure 3 Validity is degree to which study's model corresponds to theory and reliability is degree to which model corresponds to reality

Initially these evaluation parameters have been used for quantitative study and there may be some difficulties applying them to a qualitative study. However Easterby-Smith et al. believes that this parameters can be adopted for qualitative study as well by changing questions to "*Has the researcher gained full access to the knowledge and meanings of informants?*" for validity and : "*Will similar observations be made by different researchers on different occasions?*"

I believe that my study has a relatively high validity since results I arrived at can be interpreted out of view-point of theories I used. Since in general my quantitative studies (survey) confirm my qualitative studies (interviews) I believe that they have good validity as well.

Unfortunately due to low sample size the reliability of my studies is lacking. Reliability also suffers since choice of respondents could have been biased[3].

[2] Authors conversation with Thanos Magoulas.

[3] Especially by the fact that some of results came from a web-survey which was accessible only to those that use their school mail more or less often. Due to low response rate (less then 5% of potential respondents) I believe that usage of this medium is lower among general population then it is according to the survey results.

Theoretical Views

In this section I present the existing conceptual models that are relevant to my problem statement Therefore I will focus on the data processing part of the information and communication systems. Firstly I present the communication medium related factors. Secondly I identify factors that are associated with the organizational and the communicational contexts. Lastly I investigate theories dealing with the fitness between abovementioned parameters.

Communication Support Systems

Usually the concept of information system refers to all activities related with the information handling of an organization. The following definition may be seen as a sound representation of what is meant with information system.

An information system is an arrangement of people, data, processes, interfaces, networks, and technology that interact for the purpose of supporting and improving both day-to-day operations in a business (sometimes called data processing), as well as supporting the problem solving and decision making needs of management (sometimes called information services) (Whitten & Bentley, 1998)

According to Ellis (1991) Computer Mediated Communication (CMC) are systems that support groups of people engaged in a common task (or goal) and that provide an interface to a shared environment." With addition that term is broadened to all systems supporting communication, not only computer (CMC is a part of CSS).

In both cases the concept of information system and the concept of the computer mediated communication involves people, information related task and information technology (know-how to handle information as well as instruments and techniques for doing that).

Communication media related factors

Media richness theory

For the purposes of this research the aim of system studied (CSS) is communication inside an organization. According to Daft & Lengel (1986) two main goals of information-processing are stated as:

1. Overcoming of uncertainty
2. Overcoming of equivocality

Where uncertainty is lack of data and equivocality is lack of common reference system[4] between communicators.

In their media-richness theory authors state that any informational medium can be placed along a rich-lean continuum. Parameters such as ability for immediate feedback support for multiple cues, language variety and ability to tailor messages for specific respondent are used to evaluate media-richness. According to Daft's theory rich medium is considered to be preferable for assisting in communication involving problems with high equivocality whereas lean mediums are seen optimum for tasks with high uncertainty. Reason for this is that rich

[4] Information is data viewed from a certain reference system

mediums are believed to be better suited for two-sided communication, which is essential for the parties to converge on a common reference system.

According to Peppard(2000) and others it is also generally assumed that the richer the medium the lower its "range", i.e. amount of recipients it can reach

Figure 4 Peppard, Joe. Information mediums richness decreases as its range increases.

It is further discussed what different factors can cause equivocality/uncertainty which combinations of them (factors) are likely to arise in organization and what level of information richness is appropriate for satisfying the information-processing needs that arise in this situations. Mediums are put in a strict hierarchy with personal conversation being the richest followed by telephone, e-mail, mail, memos, fliers etc. Hypothetically each case of information exchange fits a certain medium that leads to optimum results.

As information technologies have developed since the establishment of this theory further research has been carried out (B. C. Y. Tan et al [1999], Chidambaram and Jones [1993], Gallupe and McKeen [1990]) that aimed at identifying the effects of inappropriate information medium richness on the efficiency and effectiveness of the various decision processes in the CSS context. Tan also discusses the effects of communication process effectiveness and efficiency for the decision and decision process satisfaction which are an important factor for success of an IS if one is to admit importance of the social effects.

Although in some respects their results are different from the rest of researchers mentioned here (mainly due to the difference in information richness of mediums tested as the authors suggest) it is an overall conclusion that although in some cases of intellective task-solving (task with low equivocality in Daft's terminology) the efficiency of rich-media communication (i.e. face to face) has suffered the effectivity has remained generally much higher than for lean-media communication and hence the satisfaction with decision has been higher for rich-media both in case of preference (high equivocality) and intellective(high uncertainty) tasks.

There are, however, concerns weather there really is an objective way to measure media richness i.e. it is likely that "richness" is not an inherent property of certain medium but rather a result of users cognitive perception of the said medium.

Tanasak Krabuanrat and Bob Phelps and in their paper "Open to discussion? The richness and choice of communications media by Asian managers" (2003) describe a study that has shown that among Thai managers the concept about mediums relative richness differed dramatically from their western counterparts. More specifically e-mail (which traditionally is considered to be a lean medium) has been rated as a rich medium, even over face-to-face conversation. More specifically e-mail was rated to have highest language variety and

personalization of all tested mediums (e-mail, telephone, face to face, memo). Face to face has in fact been rated surprisingly low on personalization ability (just over one third of the score e-mail received. The reason for this, according to Krabuanrat and Phelps is that in Thai culture display of personal affection or disaffection is highly undesirable in corporate culture. This, coupled with the fact that in most situations there are witnesses to discussion has led to situation when e-mail or telephone messages that can be send and received in a more private manner can be tailored to be far more personal than face-to-face conversation.

Moreover a conditioning effect has been recorded. It expresses itself in that Thai managers that were often educated according to Western models have acquired Western stereotype on mediums relative information richness. So when asked for medium of preference for solving equivocal task most have identified face-to-face as, the prime medium for solving equivocal tasks. However when researches specified that the task is not only equivocal, but also urgent managers have once again fallen back on e-mail as medium of choice (in described experiment there has been a condition that all people who need to be contacted are located in same building). Authors believe that this indicates that in times of stress the more deeply rooted perceptions take over whereas in calm situations managers chose the answer that was "correct" according to the education they received. This effect can be related to that of institutionalization of "best practices" when technologies and procedures that are considered to be successful in one organisation are implemented in others not because of their practical value but purely out of desire to "follow the leader". However as the social structures differ in organisations it may be unwise to consider technology as "black box" that can be just plugged into organisation and start working right away. A mutual adaptation of social and technological structures is then needed for organisation to fully "embrace" technology.

There is empirical evidence suggests that prolonged use of a certain medium causes its richness to rise sharply for the users due to their adaptation o the medium. More specifically people get more skilled at including various cues in their messages (a good example of this are "smileys" a.k.a. "emoticons") that in turn leads to increased personalisation and language variety. Also, the amount of language variety that medium can convey can be considered less important than the amount of language variety that is actually used by the sender/recipient.

Further, there is evidence that improvements in medium richness are not only due to increase in skill of using the medium but also due to fact that as groups work together under prolonged time many equivocal tasks are in fact no longer such. Groups no longer have the need to converge on similar concepts and reference to discuss things as they already share the same frame of reference. So not only the informational richness is dependant on factors other than medium used, but also there is a possibility that tasks equivocality can be reduced by ways other than direct conversation between parties (for example referencing experience from previous tasks).

In fact there concerns whether the parameters used by Daft & Langel in identifying media richness are truly sufficient for describing mediums properties regarding information exchange. For example it is possible to suggest additional parameters such as:

- Rehearsability ability to more carefully consider the way in which message is expressed so as to better tailor it to the goals and edit it before transmission,
- Reprocessability: ability to re-examine the message after the transmission
- Parallelism: ability to address several recipients at same time

(Dennis & Valacich 1999)

As we can see Rehearsability has inverse relationship with immediacy of feedback but on the other hand serves to increase degree to which message can be tailored to specific recipient (or group thereof). But according to Daft both this elements are important for mediums informational richness. So what will happen when one is increased at expense of another?

Parallelism on first sight has no relationship to information richness but it is the reason behind increased use of such "lean" mediums as e-mail or memo. We have to accept that in many cases there is direct feedback between information richness and parallelism. There are cases when using too rich medium is not merely inefficient but in fact practically impossible.
Reprocessability may also be seen as something that is not vital to the process of communication itself, but rather a part of procedures we take after communication act has been carried out. But we have to admit that this parameter is different for various mediums e.g. it is easier to reproduce a letter exchange than face-to-face conversation (and than there is a question will the cue system of face to face be transportable to any other medium?).

Information paradox

Information is knowledge communicated through the use of some language (B. Langefors 1978). In this sense communication is expected to improve the effectiveness of the organization. However, the concerned expectations often remain a dream due to the so called information paradox.

The phenomenon of "information paradox" has been defined as a situation when the users don't receive the information they require at the same time as there is an abundance of overall information in the information system (Langefors, Ackoff).

There are several explanations that are put forward that explain the malfunctioning of IT.

Firstly, there is a suggestion that IT overdoing it creating information overload. Coupled with difficulty in identifying relevant sources of information and language barriers (Large, 1990) it has led managers to believe that they lack relevant information when there is actually an overabundance of irrelevant information, or redundancy of information (Ackoff, 1967; McKinnon and Bruns, 1992).

Secondly, there is an issue of integration of several IT segments that function properly on their own but fail when attempt to integrate them is made (Dykman ,1996). Hiebler (1995) suggests that the reasons for these integration failures are the properties of information itself, namely the mix of different information types.

Finally there is an argument that although the system is functional it is frequently not used at all or not used as it was meant to be. This is explained by the fact that large parts of organizational procedures are based on organization's social structures that are resilient to change. In other words introduction of new administrative pattern is not simply substitution of one procedure by a more efficient one (as suggested by the Business Process Reengineering methods) but also requires a change in thinking patterns and preferences for the workers.

In worse cases users might stay blind to the opportunities presented by the new system because they simply don't recognize them. Jacky Swan in "Knowledge management and innovation states that networks and networking." brings forward a good example of failure in development of ERP (Enterprise Resource Planning) system for a large international organisation. There, although the system was perfectly functional in the technical sense it was

simply unused except for storing a bus schedule for one of the offices. Users of the system simply didn't feel the need in the functions that it offered. Granted given time the social and IT structures should adjust to each other but taking into account the relatively short moral life-spawn of systems it seems essential to decrease this lag to minimum which is primarily done by fine-tuning the systems to specific users needs even at development stage.

Organizational context[5]

Organization context of Communication Support Systems (CSS)

In order to investigate what factors may affect CSS in organization it is important to understand what is the position of CSS in an organization.

According to Leavitt (1965) organizations can be represented by 4 elements that mutually affect each other:

1. People: people who are part of an organization
2. Structure: The way actors are organized. For example it is possible to distinguish responsibility official information structure, unofficial information structure, power structure and so on. (Checkland, 1981)
3. Tasks: tasks that actors perform in organization, procedures.
4. Technology: Technology utilized by actors for performing tasks.(hardware/software)

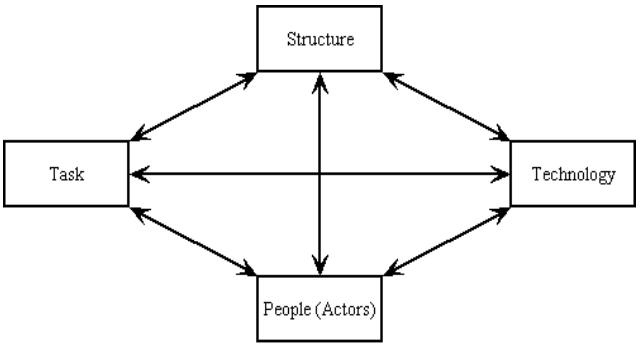

Figure 5 Leavitt's model for organizational sub-systems

This model has been further developed by Galbraith (1973) who added the concept of culture i.e. peoples basic goals, values and expectations of their surroundings (figure 3). This addition is important as people are not mere tools for performing tasks but also develop a certain attitude towards organisation (and each of its parts). Depending on this attitude the efficiency and accuracy with which people carry out their jobs may vary widely from doing tasks outside the contract to downright sabotaging the work process.

Galbraith concerns the concept of organization as an information processing system. The design and management of such system depends upon its capacity to absorb uncertainty. Accordingly, the concept of uncertainty is given in terms of balance between required

[5] In my study I define context or environment as follows: Context= (factor1 * factor 2 *…..factor j). For instance the concept of organizational context may be given in terms of mutual relationships between structure, culture, technology, actors and tasks.

information processing capacity and provided information processing capacity. Any kind of imbalance is a form of uncertainty. Uncertainty can be absorbed through (1) sharing the same hierarchy of authority (2) sharing standard operating procedures, (3) sharing the same goals and plans. However, if the requisites of balance cannot be satisfied then the following two strategies become relevant. In the first strategy we try to reduce the need for information processing capacity through (1) environmental management, (2) creation of slack resources, and (3) creation of self-contained tasks. In the second strategy we try to increase the processing capacity of the organization either (1) investments in formalized information systems, or (2) creation of lateral relationships between groups.

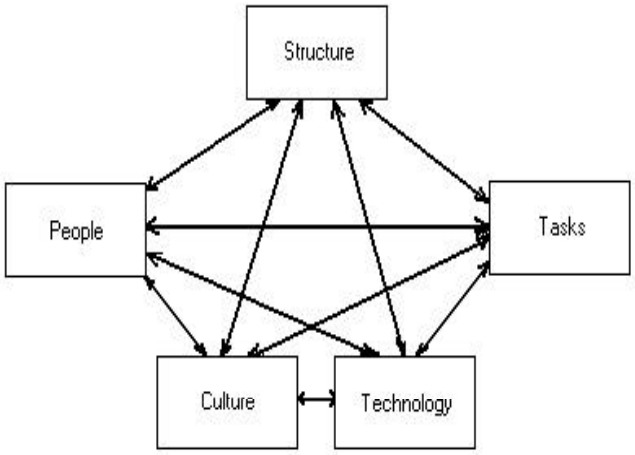

Figure 6 The concept of organization according to J. Galbraith

As we can see from this model it is possible to bring forward four relationships that IS (Technology) is involved in:

- Technology-Task: technical functionality. Does IS support the information-related processes in organization?
- Technology-People: are actors using the technology the way it was meant to be used? Are there cognitive, user interface issues?
- Technology-Structure: in what ways IS affects structure? Who has access to information? Who is responsible for supplying the information? How the information flows affect power structure?
- Technology -Culture: Does the IS help fulfil the goals of actors?

There are also indirect relationships, since change in relationship with one subsystem would also cause other relationships to change as subsystems are interlinked with each other even bypassing the technology relationship (example: Technology-Task-Structure). Which makes singling out a duplet relationship problematic. J.Harrington (1991) for example stated that all the above relationships are dependant on individual cognitive perception of the organization.
Note that Daft's information richness theory has its source just in the theory of organization as information processing systems

Information and data.

Whereas data can be defined as a certain amount of disconnected facts information is a mental model that is built upon interpreting this facts by the communication receiver. So in a way according, to Harrington**,** information transfer is inherently faulty as it is only possible to

transfer data and it's transformation into information fully depends on the receiver's frame of reference. Therefore for successful communication data processing is only part of the task, another being making sure that the data is interpreted correctly.

Communication Context

Communicating parties can be distributed in space and time. Graphically taxonomy by these variables is represented in figure, taken from Ellis.

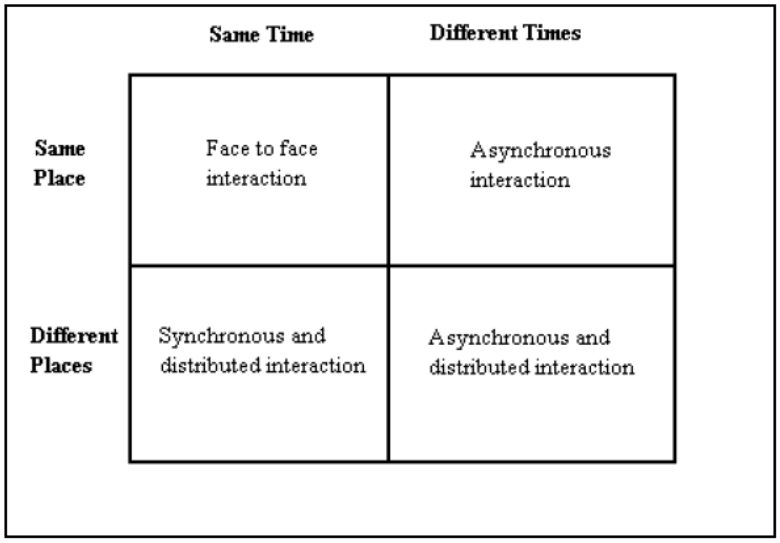

Figure 7 Time/Space taxonomy for communication according to Ellis.

- Same time, same place. Systems that allow cooperation among people that are in the same room, and at the same time (synchronous interaction). Example: face to face communication, group discussion
- Different time, same place. Support information exchange between people that occurs at same location, but at different times. Example: notice board, people working in shifts.
- Same time, different places. Allow synchronous communication among people that are physically distributed beyond "natural" (i.e. hearing, sight) range of communication. Example is a telephone/video conference.
- Different times, different places. Allow cooperation among people physically distributed in an asynchronous way. Example: e-mail, post.

Group Size Taxonomy of Information support systems

In addition to time/space taxonomy it is also possible to distinguish types of communication according to group sizes involved in that communication.

Distributed individuals and grouped individuals refer to the same as same place and different places, respectively, in the taxonomy by time and space. Distributed groups refer to distributed sets of people that are gathered together in different places. Group size: "project team" and "task force". A project team usually has from 2 to 7 members, while a task force has more than 7 members. As in the taxonomy by time and space, the extended taxonomy

by time, space and group size can be represented graphically. In this case, as we have 3 variables, the representation must be in three dimensions, as can be seen in diagram 4 taken from (Nunamaker, 1991).

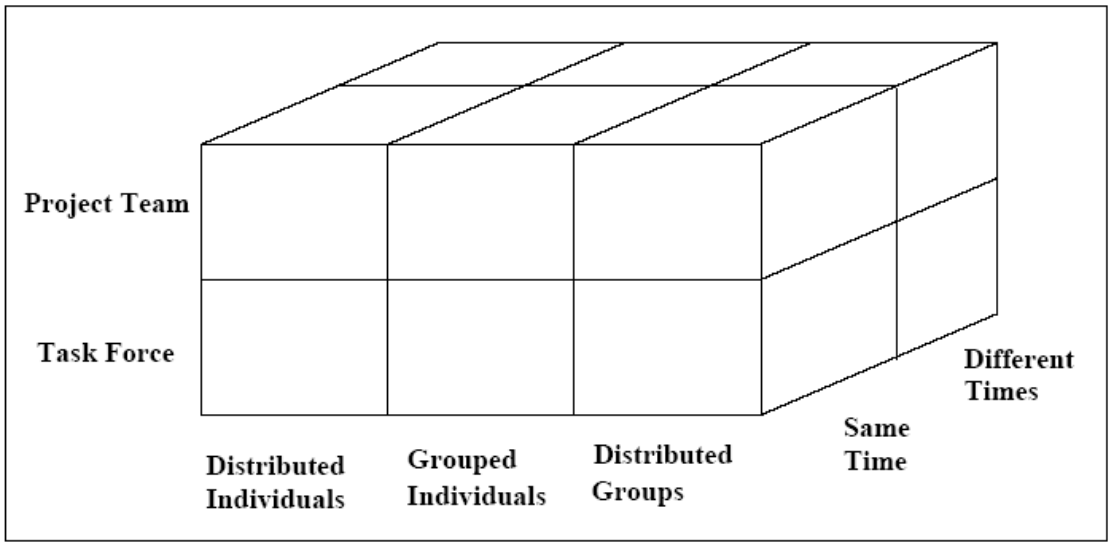

Figure 8 Time, Space and Group Size Taxonomy. Nunamaker

Taxonomy of CMC by Function

I decided not to put classification of all CSS systems here as many of them are trivial so I will concentrate on description of CMC.

There are several more or less accepted kinds of functions CMC can provide to users. Some of those classes are given bellow:

- Electronic mail. One of the oldest, well-developed and often used utilities (Easterbrook et al., 1993). Allows users to exchange messages electronically via internet (or any computer network for that matter).
- Calendaring. Allows users to create and maintain personal schedules as well as sharing them with each other for better synchronisation (Lange, 1993).
- Discussion forums (aka. electronic conferences). Originally developed from e-mail posting lists. Separate messages are compiled into an easy-to search structure and stored on a server. Allows users to access to access and exchange messages on certain topic (Hasted, 1994).
- Workflow management. The main goal of workflow management is to help group work coordination. Workflow tools automate the process of control over a project broken in to smaller tasks (Tagg 1996).
- Group decision support systems (GDSS) provide computer support for meetings, automating actions such as voting and input, classification and evaluation of ideas. Depending on solution these system are used both for distributed work and assistance in operation when all users are gathered in the same room at the same time (Kraemer and King, 1988).

- Collaborative writing. Support collaborative writing of documents such as contracts, presentations and reports. With help from these systems, multiple users can engage in cooperatively working on a document by editing parts of it (synchronously) or asynchronously and keeping track of other users modifications.
- Shared media spaces. Are computer systems that use integrated video, audio, and computers to allow individuals and groups to work together despite being distributed spatially and temporally (Mantei, 1991). Shared media spaces can be considered, in some way, as an evolution of conferencing systems.
- Instant message systems that allow users to exchange, as the name suggests instant text messages thus creating a "chat".
- Videoconferences

Fitness between contextual factors and communication media factors

Suh (1999) following the recommendations of Daft has developed a model for the study of fitness between tasks and media.

Using rich mediums to overcome uncertainty may lower efficiency of communication process as part of communication due to (but not limited to) involuntary re-establishing of already established common reference system (adding excess information to personalize message/unwanted feedback/usage of unneeded cues) and exchange of unneeded messages which lowers the overall efficiency of the process.

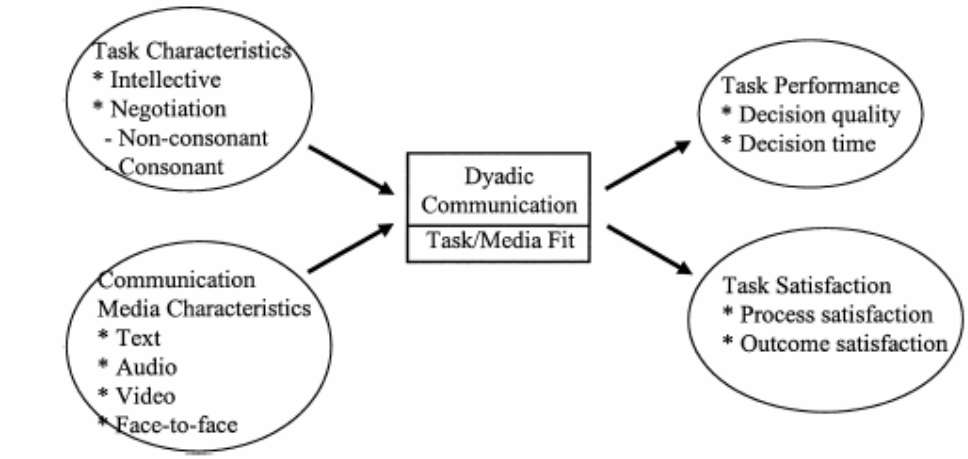

Figure 9 Task/Media Fit. Suh (1999)

Furthermore Tan has investigates specifically the effects of fitness between organizational (intellective and preferential)[6] and communicational media in terms of decision quality, decision sattsfaction, decision time, process satisfaction etc. The table below outlines some of the hypothesis that were investigated by Tan.

H1a: With an intellective task, actual decision quality will be the same in face-to-face GCSS[7] groups and dispersed GCSS groups.

H2a: With an intellective task, decision time will be higher (longer) in face-to-face GCSS groups than dispersed GCSS groups.

H3a: With an intellective task, decision satisfaction will be the same in face-to-face GCSS groups and dispersed GCSS groups.

H4a: With an intellective task, decision process satisfaction will be lower in face-to-face GCSS groups than dispersed GCSS groups.

H1b: With a preference task, perceived decision quality will be higher in face-to-face GCSS groups than dispersed GCSS groups.

H2b: With a preference task, decision time will be lower (shorter) in face-to-face GCSS groups than dispersed GCSS groups.

H3b: With a preference task, decision satisfaction will be higher in face-to-face GCSS groups than dispersed GCSS groups.

H4b: With a preference task, decision process satisfaction will be higher in face-to-face GCSS groups than dispersed GCSS groups."

Summary

The classical theory of information richness provided by Daft states that there is a bi-polar continuum of information medias with respect to information richness. It is further stated that "rich" mediums are better equipped to assist in solution of equivocal tasks whereas lean are sufficient for overcoming more structured tasks that require absorption of uncertainty. However this theory has been further developed by other researchers to accommodate for inclusion of parameters which originally were not included.

[6] Uncertainty and equivocality in terms of Daft's theory
[7] GCSS= Group Communication Support System, essentially same thing as CSS

A Conceptual model for the study of CSS

n this section I present a conceptual model for the study of Communication Support Systems. The model is essentially an attempt for the synthesis of the theories presented in the previous section. However it is necessary to indicate some crucial aspects that motivate the introduction of my model in the studies of CSS.

Definition of the communication support system

The concept of Communication Support System (CSS) is preliminary defined here as a system that provides communication support to groups of people that are engaged in common tasks or are sharing common resources, goals, values, etc. In this sense the CSS become an interface to a shared human environment. Furthermore realities of today employ information technology in the acquisition, collection, organization , processing, dissemination, etc. of information. In this sense CSS are social systems that are partially implemented through the sound use of information technology.

Crucial differences between the classical model and the purposed conceptual model.

Firstly there are several definitional differences. Secondly Galbrights model concern the imbalances in information processing faced by an organization task. However there are imbalances faced by people within and outside the organization.

Definitional differences.

The most crucial differences concern the concepts of uncertainty and equivocality.
The concept of uncertainty can be defined in terms of Galbright i.e. imbalance between the required and available information processing capacity associated with a particular task. However this rational view of uncertainty does not agree with human perceived uncertainty in this sense the more information is provided for absorbing uncertainty the more uncertain situation becomes (Ackoff).

The concept of equivocality expresses the state that one and the communicating parties interpret the same message differently. In this sense equivocality can be absorbed through the establishment of a common reference system.

Task-related uncertainty vs. human-perceived uncertainty.

The classical information richness theory is based on Galbrights concept of uncertainty. In this sense the human-perceived uncertainty has been excluded from the scope of the theory. Such exclusion makes the whole study of communication systems unclear because the more information required for the absorption of uncertainties the more uncertainty can be generated in terms of human-perceived uncertainty.

Creation of common reference system vs. coordination of existing reference systems.

The classical information richness theory suggests creation of a common reference system to absorb equivocality. For instance the aim of object-oriented approaches advocated by information engineering is just the establishment of a common reference system. However in reality such system is difficult to establish and the best way is to live with different reference systems, but taking their difference in account and coordinating them (Boland).

Relationships between organizational context and communicational context

The traditional information richness theory attempts to solve all communicational issues through changes in the communicational context. However the original Galbright theory underlying Daft's richness theory leave the possibility to solve the problem through changes in the organizational context. Thus these changes can be viewed in the following terms

- Structural changes (e.g. centralization/decentralization of authority)
- Task-related changes (e.g. structural/unstructured task, regular/irregular, change in media richness required by the task)
- Cultural (e.g. goals, constraints, priorities etc. common value system with respect to interpretation of these goals)
- People i.e. human factors, (e.g. task experience, media experience , training, education etc.)
- Environmental (e.g. technology accessibility, communication with external participants)

In other words the interaction of organizational structures – both technical and social – leads to creation of certain communication context within witch systems goals, requirements and constraints are defined.

The forgotten dimension.

Neither the classical information richness theory purposed by Daft nor the theory proposed by Suh take into account the range of communication. As we know from our theoretical views J.Peppard has provided a better understanding of the relationship between information richness and communication reach(range).

Figure 10 Information mediums richness decreases as its range increases.

However this forgotten dimension of communicational range inspires several considerations for understanding and designing sound communication support systems.

Designing communication support system.

The design of CSS aims to create such CSS that would reach this goals and requirements within constraints given by the context.

Depending on how well the design is adapted to context various effects are achieved such as

- Quality of communication – extend to witch goals set for the system are met
- Time/Resource savings – extend to witch constraints are observed

Within organizational context, which is a product of technology/structure/tasks/goals/actors systems cooperation, each communication medium has certain information richness. Context also imposes certain restrictions on use of communication mediums such as time/space distribution of communicators.

On the other hand design of CSS also assumes that mediums it utilizes have certain information richness and environment in which CSS is meant to work has certain time/space context. However it may be that these values (existing in context and assumed during the design of CSS) are not the same. In which case we see the paradox mentioned in the introduction that although system is functional it does not fulfill it's task (i.e. communication effect has negative attributes, dissatisfaction with decision process or quality).

One of the expected effects of considering mediums fitness for carrying out a task in organizational context, is the addition of constraints. Primarily factor in mediums success at performing information transfer is the very fact of mediums use – if medium is not used then it cant perform a task regardless of how hypothetically fit it is to do so. An example of such constraints would be the time/space taxonomy of communication processes in organization (which in turn may be dependant on constraints and goals of other organizational subsystems but the mechanism of such effect is beyond the scope of this model). However according to Peppard media richness is diminishing as media reach [parallelism] grows because complex communication networks grow asynchronous and distributed in space, which disallows the use of mediums that are conventionally believed to, be "rich".

However if medium richness (its ability to transfer complex messages) is not a property of medium in itself but rather the property of actor's use of medium then that graph does not need to be decreasing at all points – richness becomes factor of all conditions that form communication context and it is not impossible that in another context relationship between richness and reach will change.

Elements of the model

Organizational Context

Information and Communication Technology , Culture, Actors, Structure, Task, etc. form the organizational context.

- Structure (authority, official and unofficial information structure)
- Tasks (structural/unstructured task, regular/irregular, goal-related and administrative etc.)
- Culture (goals, constraints, priorities, common value system, etc.)
- People, i.e. human factors, (personal preferences, task experience, media experience, education etc
- Information and Communication Technology (information systems, standard operating procedures, patterns of communication, management philosophy, etc.)

However there are also other factors that belong in this context namely the organizational environment. This environment involves communication and collaboration with external participants and in many cases imposes different kinds of constraints that may affect communication aspect.

Communication Context

In the same sense people mobility , geographical distance, communication patterns (one-to-one, one-to-many, many-to-many) and other similar constraints form together the so-called communication context. With other words the communicational context deals with temporal respectively spatial constraints. In the first case communication may be characterized as synchronous /asynchronous whereas in the second case communication may take place in physical presence/social presence environment. Note that according to the so-called contingency theory of organization what here is called "communication context" is seen as part of the organizational situational factors. However due to the fact the classical richness theory deals only with the rational view of uncertainty/equivocality it does not take communication context into account and so it was decided to make this an explicit part in my conceptualization.

Communication media

In my model communication model concerns all forms of communication that are involved in the reduction of uncertainty respectively equivocality. Such means can be characterized through the following properties: 1) capacity 2) adaptiveness 3) richness (feedback, language variety, personalization, reprocessability, rehearsability and parallelism) 4) accessibility etc.

Communication effects

The common denonominator between the organizational, communicational contexts and communication media is given by communication effects such as time-saving, resource saving, communication quality/satisfaction, etc

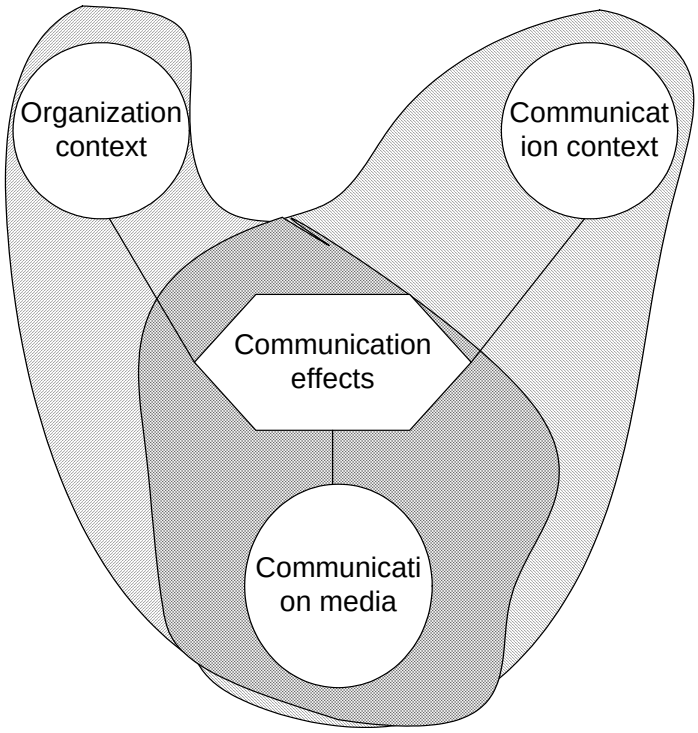

Figure 11 research model for the study of CSS

The main characteristic of this model is concentration on the fitness between organizational context, communication context and communication media characteristics. This fitness is a case of balance between requirements placed by the organizational and communication contexts and the support provided by the communication medium.

Summary

The purposed model takes into account the Task/Media Fit model (Suh 1999). However task and medium characteristics are seen as necessary but insufficient for understanding communication system. To this end I explicitly add the communication context and organizational context. The communication context is not mentioned at all in the Suh model whereas organizational context focuses only on the task –media relationship and thereby excludes the effects of structure, culture and human etc. factors on the quality of communication.

Furthermore despite the richness of Galbright model there are a lot of aspects that are not included in his model due to the focus of the model on defining the organization out of rational perspective.

Lastly despite the intentions of the classical media richness model due to its legacy to Galbrights model leads to misconception of communication phenomena and hence design of

sound communication support systems. Some of the consequences of the above mentioned misconception may be:

- Use of ill-matched medium for the task.
- Incorrect estimation of medium richness.
- Not taking into account contextual variables that may disable usage of certain medium even though it is hypothetically most appropriate.

Design of questions related to the model[8]

The design of questions to be investigated is expected to produce teachers respectively students views with respect to the three selected areas of concern: 1) Fitness between human preferences and communication media. 2) Fitness between organizational tasks and communication media. 3) Fitness between operational goals and communication media.

Fitness between human preferences and communication media (concerning student views)

Q1) What grade do you go to?
Purpose: It was assumed that students from different grades have different experience in handling various information mediums. Further it is a habit although not a rule that teacher is "leading" his group from grade to grade throughout their time at school. Therefore it was of interest how change in communication dynamics has affect values placed on different communication mediums properties and therefore choice of mediums.

Q2)How often do you use following communication forms?
Purpose for this question was to identify the actual use patterns for this communication forms. General assumption was that information channels important for achieving goals are being used more often.

Q3) rate information channels accessibility.

Q4) Rate support given by different mediums for communication between student and other groups at school.

Q5) Rate mediums according to following parameters: feedback immediacy, symbol variety, personalization parallelism, rehearsability, reprocessability.
Purpose: measuring perceived mediums richness according to various parameters would allow to track whether it differs from stereotypical (i.e. Daft's hierarchy) and whether there is difference of medium richness perception within the studied group.
Q6) How often do you visit internet from school and how often from other locations?

Q7) Would easier access to computers at school increase your use of schools website and KN?
Question is important to understand whether use pattern depends on actor/culture or technology/structure context

[8] The questions here are designed with respect to surveys

Fitness between organizational tasks and communication media (concerning student views)

Q8) How important is communication with following groups for you?
(other students, teachers, administrative staff, school management)

Q9) How well does this communication work?

Q10) What do you use communication with above groups for?
(possible alternatives are: education, social integraion, personal development, being up-to-date with school environment
Purpose: interaction may pursue a number of different aims and hence place different requirements upon communication forms thus affecting the medium choice

Fitness between operational goals and communication media (concerning student views)

Q11) How do you rate communication form according to its effectiveness, i.e. how sure you are that the recipient receives information in time and interprets it correctly?

Q12) How do you rate communication form according to it's ease of use?

Q13) How do you rate communication form according to their security and protection of integrity level?

Q14)What sort of communication do you use in case you have missed out some information?
Alternatives: student-student; student-teachers; student-administration; student-management.
Purpose for this question was to check whether there is any redundancy or back-up methods developed for communication.

Fitness between human preferences and communication media (concerning teacher views)

Q1) What grade are you in charge of?
Purpose: It was assumed that students from different grades have different experience in handling various information mediums. Further it is a habit although not a rule that teacher is "leading" his group from grade to grade throughout their time at school. Therefore it was of interest how change in communication dynamics has affect values placed on different communication mediums properties and therefore choice of mediums.

Q2)How often do you use following communication forms?
Purpose for this question was to identify the actual use patterns for this communication forms. General assumption was that information channels important for achieving goals are being used more often.

Q3) Rate mediums according to following parameters: feedback immediacy, symbol variety, personalization parallelism, rehearsability, reprocessability.

Purpose: measuring perceived mediums richness according to various parameters would allow to track whether it differs from stereotypical (i.e. Daft's hierarchy) and whether there is difference of medium richness perception within the studied group.

Fitness between organizational tasks and communication media (concerning teacher views)

Q4) What do you see as important in your work? Alternatives: student education, helping students to fit into society, helping students personal development, acting as informational link between student and school environment)
Purpose: student-teacher interaction may pursue a number of different aims and hence place different requirements upon communication forms thus affecting the medium choice

Q5) Rate how fit are this communication tools for assistance in achieving these goals (ones from question 4)?
Purpose: To see teachers opinion for "fitness" of different mediums for pursuing this goals
Q6)What sort of communication (and how often) your students (you think) use in case they have missed out some information. Alternatives: student-student; student-teachers; student-administration; student-management.
Purpose for this question was to check whether there is any redundancy or back-up methods developed for communication.

Fitness between operational goals and communication media (concerning teacher views)

Q7) How do you rate communication form according to it's ease of use?

Q8) How do you rate communication form according to its effectiveness, i.e. how sure you are that the recipient receives information in time and interprets it correctly?

Q9) How do you rate communication form according to their security and protection of integrity level?

Q10) Rate the time-saving effect of following communication forms?

Empirical views: Result

In this section I present my empirical views in terms of investigated interview and surveys issues that together provide a sound understanding of fitness between organizational factors and communication media characteristics.

First I describe the background of Schillerska – communication infrastructure - what information mediums are available This information is based in part on observations and in part on interviews with technical support personnel at Schillerska.

Secondly I describe organizational and communicational context in which information mediums are being used :who uses them, what for, in which ways does it help users achieve their goals; and this mediums perceived information richness and what qualities are valued by users in this mediums (as well as what is lacking) i.e.: immediacy of feedback, personalization ability, ability to express information more clearly etc. This information mainly comes from the interviews I have carried out and to a lesser extend from observation.

Thirdly I represent the results of the survey that has been carried out at Schillerska in a form of tables with averages from the collected data. This is meant to integrate the views on social context, media richness and organizational context into a more general context and establish quantifiable relationship between them. For example see if there is a difference in perceived medium richness among groups of students/teachers with different goals/culture or what change in medium usage pattern happens depending on change in communication context (e.g. ability to use different mediums due to availability). The survey assumes that reader has access to results of the previous segment i.e. communication context taxonomy as it must be taken into account when interpreting the results for mediums with varying taxonomy.

It has been a problematic task however to separate medium richness and communicational /organizational contexts as they are interlinked and it is often a judgment call to distinguish what is the cause and what is the effect.

Background

This study was preformed at Schillerska gymnasium (upper secondary school) in Gothenburg, Sweden. Having over nine hundred students and approximately 100 staff members school has great need of a well-functioning information system for coordination of efforts. From initial conversation with schools principal Christian Maloney the layout seemed typical for “information paradox” i.e. needed information was believed to be present in the system and there was a large numbers of information channels that could be used to deliver this information to students, yet it was generally believed by both students and staff (who complained to teachers and school management) that school’s information system does not fulfill it’s task of keeping students informed about school life. More specific information about problems was however absent. This seemed indeed to be a paradox since school had an abundance of various information mediums that could be used for communication between administration, management, teachers and students ranging from web-based solutions to face to face contact to pin-and-paper notice boards. However despite this seeming abundance of

communication possibilities information was still not reaching it's users (or users did not receive the information they required) in time and in desired form.

Web-based communication systems

The most notable computer-based medium utilized at Schillerska and which, I believe requires some background description is Kunskapsnätet[9](hereafter KN).
KN is a venture by the city of Gothenburg to reach the goal of ITiS (Information Teknologi i Skolan)[10]- educating students in the use of IT as well as improving the education process itself. It is meant for usage by all schools in the Gothenburg area from ground-schools to gymnasiums. Overall over 82 thousand people – students and teachers should be covered. The whole KN is web-based which means that access is possible from any Internet connected computer[11]. KN provides a number of tools for managing information exchange. Some of them are the following:

- E-mail. Each student receives an e-mail account with address composed as name.surname@gbgdsd.se, in case name is taken a three-digit number code is added after surname making address unique. There is a common address book containing a list of all the e-mail accounts in the system (along with their name and name of school they attend) and a personal address book that is to be filled by students themselves.
- Project room – a web-based application developed by Lotus[12] (Quickplace) integrated into KN system. Allows creation of project rooms accessible to a certain group of people where file sharing and other utilities such as common calendar, discussion forum and chat[13] are available. Using project room it is possible to collaborate over Internet on certain projects in form of sharing information and keeping track on what counterparts are doing. For instance teacher may lay out relevant notes, tasks, illustration and so on while students may upload tasks they wish to submit. It is also possible to invite temporary guests (even those who don't have a KN account) like experts in certain area, students from other locations who are interested in project and parents who want to take a look at how their child is doing. There are several levels of security access that decide to what degree certain user may alter the contents. There is also a useful online manual that helps sort out the procedures in administration of the resource.
- Information sources. A reference system to information sources ran by professional librarians. Students have ability to comment on the links, leave requests or notify of a broken link
- Own links and personal page. User may choose what page will be loaded as main when KN is accessed. There is also an option to create own Internet links in the navigation bar.

[9] "Knowledge Network" in Swedish.
[10] "Information Technology in School" in Swedish.
[11] Although due to budget issues there are restrictions to which software is to be used for access – support is given only to windows/internet explorer configuration.
[12] Software development company, subsidiary of IBM company. Developed "Lotus notes" system which is also used at Schillerska.
[13] Instant messaging system

Computers

Apart from the computer classrooms that are accessible only during the lessons (which not all of the students take – after first year it is optional) there is at present little opportunity to connect to Internet from school. There are about a dozen PC's with Windows as operational system and as many Macintosh computers[14] that are freely available for the students. Computers are located in the library and serve both for Internet access and miscellaneous work. There is no booking system so it is first come- first serve. Taking into account that there are over nine hundred students at school Internet access is somewhat problematic for the students. In part this shortage depends on a recent case of theft – all the library computers were stolen last year and they had to be substituted by older models gathered from around the school. At present there is work underway to install newly acquired computers to remedy the situation.

All the teachers have recently been equipped with mobile phones (with SMS functionality) and portable computers that allow Internet access (all classrooms are equipped with net outlets). Safes have also been installed for the storage of this computers (however at the time of writing safes were not installed at all floors which meant that some teachers had to go all the way to the safe and back should they need to store laptop in between uses).

Internal mail

Each class and each teacher have an individual mailbox inside the school building which is meant for exchange of paper-based documents.

Notice boards

There is a number of pin-and-paper notice boards in school. Generally they are divided into two groups – administrative information and "other". Although there is a person assigned to keeping them organized in practice the posts are too unstructured to judge the relevance of most materials, so there is a tendency that boards become cluttered with information that is out of date or irrelevant causing information overflow.

TV

In the hall at school the entrance there is a TV that is continuously scrolling through a PowerPoint presentation (Microsoft office presentation program) that consists of a number slides with short information messages to the students such as for example changes in schedule, daily menu. The content of the slides is controlled from the expedition Hypothetically the TV was meant to relay only the most urgent (time critical) information that is relevant for the whole school but occasionally teachers persuade expedition to include information that is related to only a small group of people thus increasing the overall number

[14] It should be noted that KN of which both project rooms and e-mail system are part of only supports "Internet Explorer" web-browser which is only available at the Windows computers

of slides and the time required from the student to look through all messages (during observed period of time there was an average of 26 messages which meat that several minutes was required to see them all). Taking into account that one of ideas of placing TV at entrance is to have students glance at it *on their way* to class this is a considerable drawback.

Schools web site

Schools web site has recently undergone reconstruction and new features are still being added. At present it provides general information about the school of which the most notable is contact information for all personnel and school news headlights. Additionally there is a restricted section requiring teachers/students log in to get access that gives them additional information such as their individual timetable.

Student group meetings

Teacher the student that are assigned as his/hers student group are according to the schedule supposed to hold a 20-minute long meetings on a weekly basis. Standard group consist of half a class, which usually accounts for approximately twelve to fifteen students per teacher but in some cases the whole class is assigned to one teacher. It is considered a benefit that the teacher in charge of the group also teaches in subject that these students take and has regular classes with them but unfortunately this is not always the case.

Meeting is usually started by the teacher reading out relevant information/handing out documentation and then students asking questions about subjects brought up. Information that is presented on this meetings generally comes from vice-principals, school superiors, or external organizations such as universities. Teachers take part of this information flow and filter out the parts they consider relevant for their students.

In nearly all interviews it was mentioned that it is an “open secret” that student attendance on such meetings is often lacking. The consequence of this may be that students turn to other communication channels for information that are not prepared to handle such issues. More specifically students often turn to expedition (or, less often to student assistant) for information which they (expedition and student assistant) do not posses. Additionally teachers who note that their group meetings are ineffective also turn to expedition with requests to send information via the internal TV, which dilutes the information that was originally meant to be shown there.

Mobile phones

As of late all members of staff have been equipped with mobile phones (with SMS functionality). Their usability is hampered by the fact that it is impossible to receive any calls during the lessons (due to disciplinary issues) and they (teachers) are discouraged from making any calls using these phones (due to monetary issues) unless it is an emergency.

A recent collection of student mobile phone numbers for emergency situations has shown that approximately 96% percent of students possess a mobile phone (at the time of writing not all

students had been contacted regarding this issue so this statistic is incomplete, but interviewed teachers confirmed that this number is close to their observations).

Stationary phones

Throughout the school there is a number of rooms which are meant for exclusive teacher use. This rooms are among other things (for example stationary computers) are equipped with telephones. Teachers spend most time in-between lessons in these rooms and are so reachable by this phones.

Empirical views provided through interviews

Communication tasks and organizational context

Roughly speaking there are four aims with which teacher communicates with student:

1. Education in his/her (teachers) subjects.
2. Overall coordination of members of their student group in their studies (development of study-plans, grades, etc)
3. Monitoring the well-being of students (disciplinary issues) –unneeded?
4. Providing students with administrative information required for taking part is school activities (information about exams procedures, possible changes in buffer-days/holidays)

When talking of education I will not refer to the process of education in the classroom, since, I believe, the pedagogical issues involved are beyond the scope of this study. Term "communicative tasks supporting education" in this essay stands for: assignment of homework to students, collection of homework from students, provision of any additional (outside the scope of subject textbook) materials by teacher such as various kinds of textual and visual aids, administrative information about events scheduled for future classes such as exhibitions, quizzes etc.

Coordination of student studies is required as each student follows an individual study plan (developed with class-teachers guidance) that must comply with school-imposed rules. This means that student has to acquire a certain amount of credits in each of the subjects chosen depending on the details of this plan. Failure to do so may jeopardize student's ability to graduate. During the course of the studies it may become apparent that either plan has to be readjusted or student must change his/her routines in order to fulfill it. It is class-teachers duty to support student in developing and following this plan.

In order to commence studies and other school-related activities students require administrative information about what takes place where, when and how does one take part in it. It may range from a sudden change in class schedule to a change in procedures for writing exams. Updates in this information may come with irregular intervals but information in itself tends to be structured and have low equivocality and volume. However there are cases when

student feedback is required (e.g. filling out different kinds of forms etc). Also, as a rule this information is important to large numbers of students.

Social integration is not a communication per se, but rather an observation of the students to insure that social atmosphere in the school is healthy. It is a highly equivocal, unstructured and equivocal task and according to teachers no technical medium can be employed for carrying it out as it heavily relies on the cues provided only by "natural" communication

In the following table I have described the structurality, regularity and equivocality attributes of these tasks.

	Regularity	Structure	Equivocality
Education	Regular	Structured/Unstructured	Low/High
Study coordination	Regular	Unstructured /Semi structured	High/Medium
Social integration	Regular	Unstructured	High
Administrative information	Irregular	Structured	Low-Medium

In order to reach these aims there is a variety of communication mediums available to the teacher:

- Personal contact with student.
- Weekly class-group meetings which are a part of school schedule.
- Internal mail
- E-mail
- KN project-rooms
- Regular telephone and mobile phones with SMS functionality.
- Post
- Notice boards (pin-and-paper)
- Internal television (used as electronic notice board)

Below I will describe how teachers utilize these mediums in performing abovementioned tasks and teachers evaluation of their (mediums) performance.

Medium properties and communication context

Time/Space Taxonomy of CSS
According to time/space taxonomy information mediums used by school can be classified as following:

	Same place	Different place
Synchronous	Student group meeting Expedition Face to face communication Communication through third party	Telephone Mobile telephone
Asynchronous	Internal mail Message board TV	KN project rooms e-mail Post SMS

Group Size Taxonomy of CSS
Group types suggested by theory are inappropriate but nonetheless I decided to divide information channels into 3 groups: distributed individuals, grouped individual, and distributed groups.

Distributed individuals	Grouped individuals	Distributed groups
KN project rooms e-mail? Post SMS? Telephone Mobile telephone	Expedition Face to face communication Communication through third party	Student group meeting

Support provided by mediums for the communication tasks.

E-mail and Project rooms are well suited for distribution of information that arrives at irregular intervals since Asynchronous/distributed access to these mediums means that there is no need for recipients of the message to synchronize and converge at same location. Accessibility of these mediums in school environment is a concern however. Namely limited number of computers that allow free access to Internet means that large queues form and some students may opt not to use Internet at school. It must be taken into consideration that considerable number of students doesn't have the possibility to access Internet from home.

Teachers in general don't consider **e-mail** being a viable medium for assistance in communication regarding larger and more equivocal/unstructured tasks. Reasons for this being:

- E-mail and project rooms do not provide instant feedback, and it is felt by the teachers that language variety that these mediums provide is insufficient for transfer of some information (which is especially the case with art-oriented classes) that are required to overcome the equivocality of the task.
- E-mail is not believed by the teachers to provide sufficient control over the fact that the recipient will indeed receive the message. This is both due to lack in standard procedures that insure that both students and teachers access their e-mail accounts

regularly and concern for technical difficulties in sending/receiving work such as undelivered mail, unfamiliar file formats or corrupted files etc. (as much computer is done by students outside of school it is problematic to guarantee software compatibility). Relatively small use of attachments means that only text format is generally associated with e-mail thus decreasing its symbol variety and placing certain cognitive constraints on the amount of data users send over.

Same concerns apply to the usage of **KN project-rooms**, however compared to e-mail they provide more control over whether the submitted information is accessible and is in proper format/not corrupted. Project rooms also have a more strict control over who has access to communication (in the sense that unauthorized users may not have access to either posting or reading any information within) and a more structured way of information presentation which in contrast with e-mail implies that all information found when accessing the medium is relevant to the communication task at hand and easier to navigate.

All this has lead to fact that some teachers actively use project-rooms in assigning homework for the students or providing some additional guidance that is not available form textbooks. However due to little experience of teachers with the web technology and their overall workload which prevents them from using technologies that they are not sufficiently at ease with implies that such use of project rooms has not, to date, become a common practice.

Interviews with students have shown that teachers concerns regarding students infrequent use of KN-based application have sound grounds as very few students in fact use them. Most students asked about the reason for this replied that first of all they prefer other web-based tools for communication and secondly that there is so little interesting information inside KN that it is not worth the effort of logging in.

Regular Telephones and **mobile phones** do not posses the capacity to transfer the amounts of information that are required by the education communication tasks. More specifically they lack in reprocessability of the submitted data and require instant feedback (as communication via phone is comparatively expensive and hence time-limited) which denies rehears ability (i.e. it is impossible to reexamine work submitted by phone as one would do with a physical copy). Moreover phone supports only one sense (audio) thus limiting the types of work that can be presented in such a manner. Phones also don't allow for parallelism which is required by educational purpose (as a group of students are being educated in the same things repeating them (studied things) separately to each student is a waste of resources). Due to this phones are as a rule not utilized by teachers for educational purposes.

SMS can only support transfer of extremely small amounts of structured data without any considerable number of cues and therefore is to date not utilized for educational purposes. On the other hand lack of immediate feedback in SMS is combined with high reprocessability and provides accessibility which is even greater then that of mobile phones. SMS messages can be accessed regardless of when they arrived and so SMS can receive them (messages) in situations when the recipient can not spare time to attend to message immediately. This was specifically noted by the teachers as phone conversations are prohibited during classes for both students and teachers. Also there is a possibility to automate SMS message composition and sending (for example "Lotus Notes" program which is already used by Schillerska contains such functionality) thus allowing for high grade of parallelism.

Internal mail allows for asynchronous communication and as such is actively utilized by teachers for collecting work done by students as in an asynchronous manner. Submitted work is in formats that allow for high reprocessability and rehearsability. Internal mail is also very easy to use and at the same time allows for security which teachers consider sufficient (at least for submission of works). Communication through internal mail is well established and is standard practice in schools, which implies that large number of students and teachers use it.

Student group meetings provide teacher with ability to address several students under his/her guidance at the same time (high parallelism). It also allows for control of student presence (insuring that message is received) and as a form of face-to-face conversation possesses high feedback immediacy and symbol variety. Personalization is believed to be lacking due to lowered security (i.e. no private things can be discussed with a specific student) and many teachers prefer to set a separate time for more in-depth conversations with students when unstructured and equivocal tasks arise (for example problems with maintaining study plan)

Notice boards and internal TV are limited in message size and do not allow for presentation of more complicated messages. On the other hand they possess high parallelism which is augmented by the ease of use. This makes them a frequent choice when there is a need to distribute administrative information. Relative ease and established procedure for maintaining information which is presented via TV makes it a more desirable option in the eyes of teachers administration and students.

Empirical views provided through survey

In the tables below results from the surveys are presented answer averages (rounded up to two decimal places) are given. No work on missing values has been carried out as some respondents have despite used blank as a value. The tables are assembled from the survey which used formulars that can be found in the appendix due to the fact that although two formulars were used for questioning of students and teachers most questions are same for both cases. The formulation of some questions slightly different as the questionnaire was aimed at non-scientific audience and use of complicated formulations could cause confusion.

Fitness between human preferences and communication medium

How often do you use the following communication forms & how effective are them?

(5=several times/day 4=each day 3=several times/week 2=several times/month 1=less often)

Media	Student	Teacher
Telephone	3,8	4,4
Mobile phone	3,9	2,5
e-mail (provided by school, part of "KN")	2,5	3,1
e-mail (personal)	3,4	2,8
Post	1,1	1,9
Internal mail	2,9	3
Face to Face communication	5	4,5
Communication via third party	3,2	1
Group meeting	3,6	3,8
Notice board	2,1	2,2
Web site	2,5	3,3
Knowledge Network	2,1	2,8
Internal TV	4,9	2,2
SMS	2,6	2,9

Some of the responses to sub-question "why do you use KN e-mail less often than personal e-mail? have been:
"No one uses KN and besides it feels unnecessary to have two e-mail addresses."
"Have had my personal e-mail for a long time, it is much more convenient."
"I don't know anything about KN, where it is located or what it is." [15]

[15] "Ingen använder kunskapsnätet och dessutom känns det onödig att ha två e-post adresser"
"Har alltid haft min egna e-post, det är mycket lättare"
"För jag kan inget om kunskapsnätet, vilken sida det står på eller vad det innebär."

What information channels are accessible for you?

Student view

Media	
Telephone	2,12
Mobile phone	4,38
e-mail (provided by school, part of "KN")	1,95
e-mail (personal)	3,21
Post	3,41
Internal mail	5
Face to Face communication	4,68
Communication via third party	4,57
Group meeting	3,45
Notice board	5
Web site	1,14
Knowledge Network	0,89
Internal TV	3,95
SMS	2,97

How often do you access internet-based school communication channels (KN, web-page) from ?
Student view

From school	3,42
From outside school	2,56

Would easier access to computers at school increase your use of schools website and KN?

Student view
5= yes, very much so; 1= No, not at all

4,17

How supportive are the following communication media with respect for providing communication between various groups for you? (Q13)

(Student view)

Rate support given by different mediums for communication between student and other groups at school.

Media	Other students	Teachers	administration staff	Management staff
Telephone	3,78	2,87	1,43	1,42
Mobile phone	4,02	2,91	2,27	1,77
e-mail (provided by school, part of "KN")	1,25	2,65	3,39	3,12
e-mail (personal)	3,81	2,8	3,67	3,66
Post	0,56	0,81	2,2	2,27
Internal mail	0,56	1,61	3,44	3,71
Face to Face communication	4,84	3,12	0,91	2,76
Group meeting	3,22	4,33	3,61	3,14
Notice board	1,58	0,97	2,99	3,45
Web site	3	1,28	3,29	3,26
Knowledge Network	2,01	2,21	2,3	3,79
Internal TV	0,78	0,8	3,62	2,84
SMS	2,72	1,29	1,43	2,8

How adequate are the following communication parameters with respect to communication media?

Rate mediums according to following parameters (on scale 1-5)

	Teachers							Students						
Media	I	S	P1	R1	R2	P2	Sum	I	S	P1	R1	R2	P2	Sum
Telephone	4	2,8	1,6	1,3	1,5	3,5	14,74	4,1	2,9	1,4	1,4	1,9	3,2	14,79
Mobile phone	3,8	2,8	2,1	2,2	0,9	3,7	15,51	4,2	2,9	2,3	1,8	0,8	4	15,92
e-mail (provided by school, part of "KN")	2,2	2,8	3,7	3,6	4,2	2,5	18,90	1,9	2,7	3,4	3,1	4,5	2,9	18,46
e-mail (personal)	2,2	2,5	3,4	3,2	3,7	2,6	17,59	2	2,8	3,7	3,7	3,9	2,2	18,16
Post	0,8	1,2	1,8	2,2	3,4	1,4	10,90	0,8	0,8	2,2	2,3	3,3	1,2	10,53
Internal mail	1,7	1,6	3,5	3,5	3,2	1,5	14,90	1,7	1,6	3,4	3,7	2,9	1,9	15,16
Face to Face communication	4,2	3,3	0,9	2,3	1,6	4,2	16,51	4,4	4,1	0,9	2,8	1,9	4,5	18,66
Group meeting	3,8	4,2	4,1	2,9	3,5	2,5	20,97	4	4,3	3,6	3,1	3,2	2,6	20,84
Notice board	0,8	1,3	3,2	3,5	1,4	1,2	11,44	0,8	1	3	3,5	1,8	1,2	11,21
Web site	0,8	1,5	3,3	3,5	2,4	1,1	12,51	1,3	1,3	3,3	3,3	2	0,6	11,83
Knowledge Network	1,1	2,1	2,8	3,4	2,7	1,6	13,58	0,9	2,2	2,3	3,8	3,1	1,3	13,62
Internal TV	0,8	1,2	3,8	2,5	0,8	0,8	10,04	1,2	0,8	3,6	2,8	0,6	0,9	9,96
SMS	2,2	1,2	1,8	2,8	1,5	3,1	12,59	2,4	1,3	1,4	2,8	1,5	3,4	12,81

Diff factors
I=Feedback immediacy
S=Symbol Variety
P1=Parallelism
R1=Rehearsability
R2=Reprocessability
P2=Personalization

Fitness between organizational tasks and communication media

How important are the following communication patterns and to what degree are you satisfied with them?

(Student view)

	Important	Satisfied
Student - student communication	4,43	4,26
Student - teacher communication	4,56	3,82
Student - administration communication	2,73	3,01
Student – school management	1,2	2,3

What do you see as important task in school
(Teachers view)

	S	T
Student education	5	4,84
Students Social integration	2,1	4,30
Students personal development	3,47	3,84
Keeping students up to date with school life	3,78	3,53

How the following communication forms fit the achievement of the organizational goals?

(The answers refers only to the teachers' views)

Media	Educating Students	Helping students social integraion	Students personal development	Providing student with administrative information
Telephone	2,07	0,84	0,76	1,15
Mobile phone	1,38	0,61	0,46	1,07
e-mail (provided by school, part of "KN")	1,92	0,53	0,53	2,23
e-mail (personal)	0,76	0,92	0,46	1
Post	0,38	0,69	0,30	1,46
Internal mail	2,15	0,92	0,69	4,07
Face to Face communication	4,92	3,84	3,92	3,76
Group meeting	2,03	3,07	2,07	4,15
Notice board	1,07	1,76	1,84	3,38
Web site	0,92	0,92	0,61	1,69
Knowledge Network	2	1,61	1,61	1,92
Internal TV	0,46	0,23	0,30	3,53
SMS	0,07	0,07	0,07	0,61

How the following communication forms fit the achievement of the organizational goals?

(The answers refers only to the students' views)

	Being up to date with schools life	Receiving education	Adopting to society	Personal development
Student - student communication	3,24	1,56	4,21	3,26
Student - teacher communication	3,78	5	2,1	3,47
Student - administration communication	3,82	1	0,54	0,45
Student – school management	2,1	1	0,23	3,12

Fitness between operational goals and communication media

How adequate are the following communication forms with respect to requisites of ease of use ?

Media	Student	Teacher
Telephone	4,12	4,76
Mobile phone	4,07	4,61
e-mail (provided by school, part of "KN")	2,14	3,69
e-mail (personal)	4,33	4
Post	1,07	2,53
Internal mail	3,25	3,84
Face to Face communication	4,23	4,76
Group meeting	3,64	4,23
Notice board	3,03	3
Web site	2,7	3,15
Knowledge Network	1,93	2,76
Internal TV	2,89	3,23
SMS	2,81	1,92

How adequate are the following communication forms with respect to the requisites of security and the requisites of protection of integrity?

Media	Students	Teachers
Telephone	3,4	3,46
Mobile phone	4,46	4,15
e-mail (provided by school, part of "KN")	4,39	3,92
e-mail (personal)	4,06	4,30
Post	2,22	2,53
Internal mail	1,87	1,69
Face to Face communication	4,13	3,92
Group meeting	2,26	2,46
Notice board	0,55	1
Web site	0,91	1
Knowledge Network	2,41	2,23
Internal TV	1,06	1,30
SMS	2,98	2,84

How adequate are the following communication forms with respect to the requisites of time saving

Teachers view

Media	
Telephone	4,07
Mobile phone	4,23
e-mail (provided by school, part of "KN")	2,76
e-mail (personal)	3
Post	2,07
Internal mail	4,30
Face to Face communication	3,23
Group meeting	4,46
Notice board	3,69
Web site	3,07
Knowledge Network	2,30
Internal TV	3,30
SMS	2,07
If other: specify	0

How adequate are the following communication patterns with respect to requisite of completing missing information

	S	T
Student - student communication	4,28	2,23
Student - teacher communication	3,86	2,61
Student - administration communication	0,95	0,92
Student – school management	1,26	0,78

How effective is your communication with respect to recipients ability to provide a correct interpretation of information exchanged?

Media	Student	Teacher
Telephone	4,79	4,38
Mobile phone	4,69	4,46
e-mail (provided by school, part of "KN")	2	2,46
e-mail (personal)	2,21	2,23
Post	2,28	1,92
Internal mail	2,8	3,07
Face to Face communication	4,79	4,84
Group meeting	3,45	3,76
Notice board	2,07	2,15
Web site	2,25	2,46
Knowledge Network	2,9	2,61
Internal TV	3,01	2,61
SMS	1,8	1,92

Discussion

Understanding the contexts of communication media

Organizational context

Modern organizations in general and schools in particular have a pretty traditionalist attitude when it comes to communication culture. There are certain stereotypes of how communication *should* be which are rather hard to break. This represents itself in the reluctance to use certain communication mediums. For instance as all teachers now poses mobile phones with publicly accessible phone numbers there was an assumption that SMS contact between students and teachers would occur. But students seem reluctant to initiate it and rather then sending an SMS to a teacher directly send it to a friend who then notifies a teacher that such and such is being late or whatever is the case at hand. Same goes for contacting teachers(or administration) on the phone or via e-mail. It seems that students discard certain possibilities for contact in favour of more traditional approach. This creates a situation when teachers (administration/management) believe that they are accessible by the students via a certain medium whereas in practice they are not.

The procedure of information collection and its transfer to the student are left pretty much to each teacher's own design. This means that a lot depends on that particular teachers attitude towards students and information medium. Students often remarked that different teachers have different preferences when it comes to sharing information which means that students who have no choice over which medium to use for information exchange have to adapt to multiplicity of ways. Needless to say this doesn't always work, especially at initial stages of education when students don't know their teachers well and so information goes amiss even though teacher is willing to share and students are ready to receive.

Communication context

Similarly with many modern organizations studied school has proven to be a highly asynchronous environment. All students have different study plans, different schedules, there is sufficient difference in time required for them to travel to school so their ability to respond to unplanned summons differs greatly. However as we can see from the empiric evidence the most used communication forms (personal or group meetings) are synchronous, and require that all parties be assembled at one location. Result of this is that mediums that are fit for the information transfer task in the sense of Draft's information richness may fail simply because due to asynchrony there is no one there to use them.

In group-size taxonomy the role of student groups is unclear. At present they are treated as if it was a simple "same place/ same time" meetings – teachers gather all students at one spot and give them the information. However based on the data gathered I believe it may be possible to treat them as "distributed groups/different time" meetings in the sense that the information that teachers share originates elsewhere and is common for several groups. In many cases teachers are not required to add to the information, they merely act as filters picking out the bits relevant to students. Being a synchronous activity group meetings force students to synchronize their actions which means that students (and teachers) may have to introduce periods of idleness to their schedule which are larger than time-slot allocated for the

meeting itself which may be a cause for irritation. Should this meetings be approached as different time/different place a shift of information transfer to some leaner asynchronous medium, for example e-mail, or KN's project room, or internal mail may prove advantageous. This would allow spending more of "synchronous time" for activities that require more personal touch and direct feedback.

Fitness between communication and organization.

Fitness between human preferences and communication media

Communication is an integral part of any organization. Accordingly there is no organization without communication. Organizational design can reduce the need of communication but may never eliminate it. Communication media can improve or disrupt the communication. However our knowledge of design of media is neither complete nor consistent. In any case the partial study of communication media and organizational task provide a misinterpretation because of the ill fit between communication media, organizational and communicational context. The above arguments are supported by the empirical views of this study.

According to the empirical material provided by the interviews and survey, the various communication media are associated with different grades of equivocality. This can be explained by the means of the degree of structure and regularity of the tasks, direction of communication (functional/administrative), task experience and technology experience, cultural constrains etc. Thus the fitness between communication context, organization context and media determined by who communicates with whom? Why? By the means of which communication media? and what communication effect is desired respectively achieved? According to the empirical study there is no such universal communication media that covers the requirements posed by all communicational situations.

More specifically with respect to the human preferences for certain communication media my study show that Face to face communication, group meeting, telephone and internal mail are the preferred communication media. However there is a significant difference of how often a particular media I s used. Accordingly face to face communication is the most desired form. It is followed by group meetings, communication through telephone and mobile. This aspects are indifferent between students respectively teachers.

There is no clear conception of which communication pattern (of communication between groups) is preferred by students for all cases of communication. Accordingly the communication media preferences vary depending on between which groups communication occurs. For example students communication with other students through mobile phone is significantly higher than the use of the same medium for communication with management.

When looking at perceived medium richness with added parameters such as parallelism, rehearsability and reprocessability it is noteworthy that the richest medium for both students and teachers is group meetings and face-to face is rated second among students and fourth among teachers. Even more surprising e-mail is high in ranks (personal and KN-provided e-mail are second respectively third for teachers and third respectively fourth for students) in both groups scoring higher then either mobile or stationary telephones which is a significant difference compared to results predicted by Daft. However we see a conflict here with questions about use of medium and medium effectiveness – in both those cases face-to-face

has been a primary choice and e-mail has scored mediocre. What may be the cause of this? I believe there are two equally options that are equally intriguing:

- The choice of communication medium and it's perceived efficiency are affected by factors other then mediums information richness.
- The arithmetic sum of parameters that form media richness is not an adequate parameter for measuring media richness. Particularly from the interviews I have formed an impression that interviewees don't place same value on all the parameters (again this may be due to effect from factors which couldn't be identified, for instance security, ease of use and accessibility, communicational context etc.) that form mediums information richness.

Therefore a reach/lean approach is not altogether viable as it assumes that all parameters have equal weight in establishment of information richness whereas this weight may vary depending on organizational and communication contexts and so the model should be multi-polar rather then bi-polar to allow for more accurate measurement.

The frequency of use of a certain medium in part depends on whether that medium is readily available when need in it arises. As we can see from the empirical results student access to internet-based communication media are very limited and many students believe that given easier access they will us KN more. Additionally is relatively little amount of student-related information that passes through e-mail so students basically don't expect to find anything useful in their inbox and as consequence don't even bother looking. On the other hand being aware that very few of their counterparts check their KN e-mail account regularly not many students bother to send out e-mails since they don't expect anyone to answer, which turns into a vicious circle that leaves school-provided accounts deserted. In other words there is a need for minimum critical user mass for using a communication form to make sense (Damsgaard, J. and Scheepers, R. [1999], Stenmark, D. and Lindgren, R. [2003]). Similar situation among teachers was avoided due to management insisting on communication via e-mail thus kick-starting the system, however it wasn't repeated among students since in school-student relationship Face to Face communication is still the preferred option and few students consider the possibility of mailing personnel instead of knocking on door. It should be noted however that such engagement in schools life, such as students council for example leads to increase in school e-mail among participants.

Fitness between organizational tasks and communication media

Communication expresses the interactions between people involved in different organizational tasks. In other words the focus here lies in the nature of the task. Whereas in the previous case the focus was on the whole nature of the context (organizational factors, contextual factors, human factors, media factors, etc.).

Some of these tasks are primary, i.e. goal related, whereas others are administrative. Usually the administrative tasks have a vertical communication structure and are regular and well structured. Whereas the primary tasks can be either structural or unstructured, regular or irregular, local or global etc.

The empirical views are provided by interviews and survey data agree with the above task characterization as well as the media involved in communication

According to students the communication with other students and teachers are significantly more important than communication with administration and communication with management is even less important. This may be caused by the fact that communication tasks

associated with teachers and students are seen as primary whereas communication with administration and management plays a supportive role. In a way this is also supported by the question which asks students and teachers of what goals they pursue in school.

Both groups have placed student education as primary and remaining tasks (social integration, students personal development and administrative information support as less important. It should be noted that students don't see social integration as one of their goals – so in a way the communication between teachers and students is one sided in this respect (an observation of the real process of integration which happens during student-student communication)

When considering what communication mediums may be used for fulfilling the organizational tasks we see that administrative information is believed to be fit for transmission via most mediums whereas other tasks can also be carried out via a smaller choice of mediums. This reflects the belief that structured and unequivocal information is considerably easy to transfer.

Fitness between operational goals and communication media

Information richness is a necessary, but insufficient presumption for the functionality of communication support system because there are a lot of operational goals and preferences that are situational rather then universal. The empirical views provided through survey support this suggestion.

It should also be noted that when searching for missing information(that they were supposed to receive from teachers/administration but either haven't done so or forgot it) students opt to turn to other students for help rather then school personnel which is a sign of unofficial information system which teaches are only partially aware of.

With respect to ease of use there is no significant difference between teachers and students however some differences are observed (for example SMS, post, KN-provided project rooms and e-mail). This may depend on such human factors as media experience and other human factors. According to this results SMS and KN are seen as the most inadequate communication forms with respect to ease of use and telephones, face to face communication and group-meetings the most desired.

With respect to the requisites of security and protection of integrity the desired forms are the same for both students and teachers are telephone, mobile, e-mail, SMS and face to face communication whereas the rest are considered less adequate.

With respect to effectiveness of a certain medium for message transfer the desired forms are the same for both students and teachers are phones (mobile and stationary), internal mail and face to face communication. It should be noted that when comparing tables for effectiveness of medium and how often it is used it is possible to observe that that the patterns don't much (for instance teachers place great faith on mobile phones but use them rarely which may be due to structural limitations)

As we can observe there is a difference in medias, which are considered desirable with respect to various operatioal goals. This implies that the overall desire ability depends on the personal preferences rather then rational standards.

Summary and Conclusions

The purpose of this inquiry is to identify and understand **the factors that promote the use and success respectively hamper and obstruct of communication support systems (CSS).** Improved understanding of these factors will hopefully lead to development of more robust CSS system, which is essential for improved management of organization. Thus, the enterprise of mine study has been delineated and focused on the following question:

> What factors are responsible for successful fit between the communication mediums characteristics and an organizations communicational character ?

Conclusions

The following three statements represent a sound rather than conclusive answer to the investigated issue:

- Firstly, the success of communication depends on the fitness between factors related with: organizational context communication context and communication media. Accordingly, the fitness is expressed in terms of a matching between required richness and provided richness.

- Secondly, the fitness between organizational related factors and communication media related factors depends human factors such as task experience and communication media experience.

- Thirdly, the fitness between organizational related factors and communication media related factors depends on human perceived uncertainty rather than task uncertainty as the information richness theory presupposes.

In the case of the first conclusion the following aspects must be taken into account. The classical information richness model is expected to be multi-polar rather than bi-polar (rich/lean) because **firstly**, the communicative context (contextual factors) places certain constrains (temporal/spatial distance, global/local etc) **secondly** the organizational context (organizational factors) places certain priorities (timelines, correctness, clarity etc) and constrains (structural rather then unstructural information, regular/irregular, etc), just on the same communication process. In summary, the multiplicity of task purposes served by a single communication media can lead to increased risks of miscommunication. Thus, the quality of communication process where actors employ certain support systems depends not only on those systems but also on the way actors use them. That way of use, in turn, depends on multitude of context factors (technical, cultural, structural, procedural and user context). In other words when considering communication forms task fitness it is not enough to look at it's technical parameters – apart from the fact that actors usage of communication form will likely differ from the one modeled in systems design there is also the factor that context places certain constrains on the use of mediums.

In the case of the second conclusion the following aspects must be clarified. Firstly, the organizational factors to be considered can be given in terms of operative purposes such as time-saving, requisite security and integrity, etc. Secondly, the communication media factors may be stated in terms of ease of use, provided security and integrity, etc. Lastly, in real life (at least in that segment of real life which was researched in this study, as perceived by the researcher) users often don't have the leisure to choose conditions under witch communication takes place and medium that is best fit to transfer information out of information richness point of view may be simply unavailable. Even if situation is not so drastic that medium just *cant* be used it must be taken into account that communication may have several priorities, for example information transfer, social contact and constraints in form of time that is available and resources that may be spent at establishing communication. Should constraints be stretched, in our case meeting takes place in time moment that is inappropriate for some participants (e.g. collision with bus schedule) the satisfaction from the communication process may suffer and as result participants may opt not to participate in communication at all.

In the case of the third conclusion the following aspects must be considered. Mine first conclusion is based on the rational interpretation of communication. Accordingly, the success of communication depends on the capacity of communication media to absorb task uncertainty and task equivocality through the satisfaction of required information. However, the provided information can increase both uncertainty and equivocality because the irrational nature of the users. Thus, the provided information has the same possibilities to decrease respectively increase uncertainty and equivocality. Thereby this situation can lead to requisite of more time for performing a certain task. The situation just indicates a conflict with our second conclusion. If the above argument is right then the whole concept of media richness must be investigated out of human factors with respect to the cases of perceived uncertainty.

Limitations and future research

Usage of the word "context" implies that it is impossible to single out each parameter that affects our system due to the fact that they are so numerous and intertwined. This has been a considerable problem during this study as object area proved to be considerably larger than it was initially anticipated. Due to this some parts of this study have less depth than they should have had. For example the study of time/space context would have benefited greatly from introduction of user-mobility theoretical framework and Human-Computer Interaction (HCI) theories would have given give greater insight into actors use of computer technology.

Although quantitative methods have been used for this study the small number of respondents doesn't allow drawing any statistically significant conclusions as to the nature of relationship between mediums properties and its fitness for performance of certain tasks. More specifically it would be interesting to investigate relationship between time people spent in organization and change (if any) of their communication patterns concerning both the perceived parameters of communication mediums and aims pursued in communication.

Bibliography

Ackoff R. (1967). Management Misinformation Systems. *Management Science*, Vol. 14, No. 4, pp. 147-156,

Backman, J. (2002). *Rapporter och uppsatser*. Studentlitteratur, Lund.

Brynjolfsson Erik. (*1993)* The productivity paradox of information technology *communications of the ACM , Vol. 36, Issue 12, p66*

Chidambaram, L. and Jones, B. (1993). Impact of communication medium and computer support on group perceptions and performance: A comparison of face-to-face and dispersed meetings. *MIS Quarterly, Vol. 17, Issue. 4, pp. 465-491* Communications of the ACM, 1993, Vol. 36, Issue 12, p66, 12p New York, NY, USA , ACM

Daft, R. L. and Lengel, R. H. (1986), Organizational Information Requirements, Media Richness and Structural Design, *Management Science*, Vol. 32, No. 5, pp. 554-571.

Damsgaard, J. and Scheepers, R. (1999). Power, influence and intranet implementation: a safari of South African organizations, *Information, Technology & People, Volume 12, No 4,* pp. 333-358.

Davidson, B., Patel, R. (1994). Forskningsmetodikens grunder – Att planera, genomföra och rapportera en undersökning. Lund, Studentlitteratur.

Alan R. Dennis and Joseph S. Valacich. Rethinking Media Richness: Towards a Theory of Media Synchronicity. *Proceedings of the 32nd Hawaii International Conference on System Sciences - 1999*

Descartes, Rene. "Rules For The Direction Of The Mind." *Descartes Philosophical Writings*. Translated by Elizabeth Anscombe and Peter Thomas Geach. Thomas Nelson and Sons Ltd. London. 1954. p. 153-180.¨

Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company.

Easterbrook, S. M., Beck, E. E., Goodlet, J. S., Plowman, L., Sharples, M., & Wood, C. C. (1993). *A Survey of Empirical Studies of Conflict. In S. M. Easterbrook (Eds.), CSCW: Cooperation or Conflict*?. London: Springer-Verlag.

Easterby-Smith M., Thorp R. & Lowe A. (1991). Management Research . An

Ellis, C. A. et al, (January 1991) Groupware: Some Issues and Experiences, *Communications of ACM, Vol. 34, No. 1*, pp. 38-58. New York

Galbraith, J. R. (1973). *Designing complex organization.* Addison-Wesley

Gallupe, R. B. and McKeen, J. D. (1990). Enhancing computer-mediated communication: An experimental investigation into the use of a group decision support system for face-to-face versus remote meetings, *Information and Management*, Vol. 18.

Hasted, E. (1994), Computer Conferencing, Groupware in the 21st Century, P. Lloyd (Ed), Praeger, Westport, CT, pp. 81-85.

Harrington, J. (1991). *Organizational Structure and Information Technology*. USA Prentice-Hall

Hiebler, R. (1995). *Capturing Organization Knowledge at Arthur Andersen Continuous Journey, Fall.* pp. 16-18.
Introduction. London, U.K.: SAGE.

Krabuanrat Tanasak, Phelps Robert. (2003) *Open to discussion? The richness and choice of communications media by Asian managers*. Sasin Business School, Chulalongkorn University Cranfield University School of Management

Kraemer, K.L., and King, J.L. (June 1988)Computer-based systems for cooperative work and group decisionmaking. *ACM Comput. Surv. Volume 20,Vo 2*, 115-146.

Lange, B.M. (1993), Electronic Group Calendaring: Experiences and Expectations, *Readings in Groupware and Computer-supported Cooperative Work*, R.M. Baecker (Ed), Morgan Kaufmann, San Mateo, CA, pp. 514-518.

Langefors B. (1978). Analysis of user needs. In G. Bracchi and P.C. Lockermann, red. Information systems methodology. Iberlin, Springer-Verlag

Leavitt, H.J. (1965) *Applied organizational change in industry: Structural, technological and humanistic approaches*. In March, J.G. (ed) *Handbook of organizations*, pp. 1144-1170, USA, Chicago: Rand McNally.

Mantei, M., R.M. Baecker, A.J. Sellen, W.A. Buxton, T. Milligan and B. Wellman (1991), *Experiences in The Use of a Media Space*. Proceedings of Conference on Human Factors in Computing Systems, The Association for Computing Machinery, New York, NY, pp. 203-208..

McKinnon, S. M. and William J.Bruns, J. (1992). *The Information Mosaic*. Harvard Business School Press, Boston, MA.

Merriam, Sharan B. (1998). *Qualitative Research and Case Study Applications in Education.* USA, CA, San Francisco. Jossey-Bass

Mintzberg, H., 1973. *The Nature of Managerial Work.* New York: Harper & Row

Nunamaker, J., et al. (1991).Electronic Meeting Systems to Support Group Work. *Communications of ACM, Vol. 34, No. 7*, pp. 40-61

Peppard, Joe (2000) Customer Relationship management (CRM) in Financial Services, *European Management Journal, Vol 18 No 3,*

Stenmark, D. and Lindgren, R. (August 4-5, 2003). Designing Intranet Applications for Knowledge Management: Towards Technology Affording User Participation. *In Proceedings of AMCIS* Tampa, Florida, , pp. 2600-2606.

Suh, K.S. (1999). Impact of communication medium on task performance and satisfaction: an examination of media-richness theory. *Information & Management,* 35, 295-312.

Swan J., Newell S., Scarbrough H. and Hislop D. (1999), 'Knowledge Management and Innovation; networks and networking'. *Journal of Knowledge Management. Vol. 3 No. 4,* pp262-275

Tagg, R.M. (1996), Workflow Support across Organisational Boundaries, *Proceedings of the 1st Information Systems Conference of New Zealand*, P. Salis (Ed), IEEE Computer Society Press, Los Alamitos, CA, pp. 32-42.

Tan B.C.Y., Wei K.K., Sia C.L., and Raman K.S. (March 1999). A Partial Test of the Task-Medium Fit Proposition in a Group Support System Environment. *ACM Transactions on Computer-Human Interaction,* 6:1, pp. 47–66.

Whitten, J. L. and Bentley, L. D. (1998). *Systems Analysis and Design Methods (4th Ed).* New York, NY: McGraw-Hill.

Web sites:

Knowledge Network's FAQ [www dokument].
URL :
http://www.gbgsd.se/prod/kn_dalis.nsf/0/ae239b0ad90886a6c125692d003c986b?OpenDocument

Appendix: survey formulars

Student

Q1) What grade do you go to? 1☐ 2☐ 3☐

Q2)How often do you use following communication forms?

Media	Several times/day	Daily	Weekly	Several times/month	Less often
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (private)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
Internal mail	☐	☐	☐	☐	☐
face to face conversation	☐	☐	☐	☐	☐
third party*	☐	☐	☐	☐	☐
students group meeting	☐	☐	☐	☐	☐
message board	☐	☐	☐	☐	☐
schools web-site	☐	☐	☐	☐	☐
Knowledge network (project rooms and so on)	☐	☐	☐	☐	☐
TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

*For example asking your classmates which you would otherwise receive from teacher.

In case you use your private e-mail more often than one provided by school please state the reason.

Q3) How often do you visit internet from school and how often from other locations

	Several times/day	Daily	Weekly	Several times/month	Less often
In school	☐	☐	☐	☐	☐
Outside school	☐	☐	☐	☐	☐

Q4) Would easier access to computers at school increase your use of schools website and KN?

Yes, a lot No, not at all

☐	☐	☐	☐	☐

Q5) Rate mediums according to following parameters (on scale 1-5)

Media	Feedback Immediacy	Symbol Variety	Parallelism	Rehearsability*	Reprocessability**	Personalization
Telephone						
Mobile phone						
e-mail (provided by school, part of "KN")						
e-mail (personal)						
Post						
Internal mail						
Face to Face communication						
Communication via third party						
Group meeting						
Notice board						
Web site						
Knowledge Network						
Internal TV						
SMS						
Other:						

* ability to modify message before it is sent
** ability to refer to message at a future occasions

Q6) How do you rate communication form according to their security and protection of integrity?

Media	1	2	3	4	5
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (private)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
internal mail	☐	☐	☐	☐	☐
face to face conversation	☐	☐	☐	☐	☐
third party*	☐	☐	☐	☐	☐
students group meeting	☐	☐	☐	☐	☐
message board	☐	☐	☐	☐	☐
schools web-site	☐	☐	☐	☐	☐
Knowledge network (project rooms and so on)	☐	☐	☐	☐	☐
TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

Q7) rate information channels accessibility.

Media	1	2	3	4	5
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (private)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
internal mail	☐	☐	☐	☐	☐
face to face conversation	☐	☐	☐	☐	☐
Third party*	☐	☐	☐	☐	☐
students group meeting	☐	☐	☐	☐	☐
message board	☐	☐	☐	☐	☐
schools web-site	☐	☐	☐	☐	☐
Knowledge network (project rooms and so on)	☐	☐	☐	☐	☐
TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

Q8) Rate support given by different mediums for communication between student and other groups at school.

Media	Communication with other students	Communication with teachers	Communication with administration	Communication with school management
Telephone				
Mobile phone				
e-mail (provided by school, part of "KN")				
e-mail (private)				
Post				
internal mail				
Personlig samtal				
third partyiet				
students group meeting				
message board				
Skolas hemsida				
Knowledge network (project rooms and so on)				
TV				
SMS				
Other				

Q9) How important is communication with following groups for you?

	1	2	3	4	5
Communication with other students	☐	☐	☐	☐	☐
Communication with teachers	☐	☐	☐	☐	☐
Communication with administration	☐	☐	☐	☐	☐
Communication with school management	☐	☐	☐	☐	☐

Q10) How well does this communication work?

	1	2	3	4	5
Communication with other students	☐	☐	☐	☐	☐
Communication with teachers	☐	☐	☐	☐	☐
Communication with administration	☐	☐	☐	☐	☐
Communication with school management	☐	☐	☐	☐	☐

Q11) What do you use communication with above groups for?

	Keeping up to date with school life	Social integration	Education	Personal development
Communication with other students				
Communication with teachers				
Communication with administration				
Communication with school management				

Q12) How do you rate communication form according to its effectiveness, i.e. how sure you are that the recipient receives information in time and interprets it correctly?

Media	1	2	3	4	5
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (private)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
internal mail	☐	☐	☐	☐	☐
face to face conversation	☐	☐	☐	☐	☐
Third party*	☐	☐	☐	☐	☐
students group meeting	☐	☐	☐	☐	☐
message board	☐	☐	☐	☐	☐
schools web-site	☐	☐	☐	☐	☐
Knowledge network (project rooms and so on)	☐	☐	☐	☐	☐
TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

Q13) How do you rate communication form according to it's ease of use?

Media	1	2	3	4	5
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (private)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
internal mail	☐	☐	☐	☐	☐
face to face conversation	☐	☐	☐	☐	☐
Third party*	☐	☐	☐	☐	☐
students group meeting	☐	☐	☐	☐	☐
message board	☐	☐	☐	☐	☐
schools web-site	☐	☐	☐	☐	☐
Knowledge network (project rooms and so on)	☐	☐	☐	☐	☐
TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

Q14)What sort of communication do you use in case you have missed out some information.

	1	2	3	4	5
Communication with other students	☐	☐	☐	☐	☐
Communication with teachers	☐	☐	☐	☐	☐
Communication with administration	☐	☐	☐	☐	☐
Communication with school management	☐	☐	☐	☐	☐

Teacher

Q1) What grade are you in charge of ?

1	2	3
☐	☐	☐

Q2)How often do you use following communication forms?

Media	Several times/day	Every day	Every week	Several times per month	Less often
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (private)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
internal mail	☐	☐	☐	☐	☐
face to face conversation	☐	☐	☐	☐	☐
third party*	☐	☐	☐	☐	☐
students group meeting	☐	☐	☐	☐	☐
message board	☐	☐	☐	☐	☐
schools web-site	☐	☐	☐	☐	☐
Knowledge network (project rooms and so on)	☐	☐	☐	☐	☐
TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

Q3) Rate mediums according to following parameters (on scale 1-5):

Media	Feedback Immediacy	Symbol Variety	Parallelism	Rehearsability*	Reprocessability**	Personalization
Telephone						
Mobile phone						
e-mail (provided by school, part of "KN")						
e-mail (personal)						
Post						
Internal mail						
Face to Face communication						
Communication via third party						
Group meeting						
Notice board						
Web site						
Knowledge Network						
Internal TV						
SMS						
Other:						

* ability to modify message before it is sent

** ability to refer to message at a future occasions

Q4) What do you see as important in your work:

	1	2	3	4	5
Educating Students	☐	☐	☐	☐	☐
Social integraion	☐	☐	☐	☐	☐
Students personal development	☐	☐	☐	☐	☐
Keeping students up to date with events in school (and beyond)	☐	☐	☐	☐	☐

Q5) Rate how fit are this communication tools for assistance in achieving these goals?

Media	Educating Students	social integraion	personal development	Keeping students up to date
Telephone				
Mobile phone				
e-mail (provided by school, part of "KN")				
e-mail (personal)				
Post				
Internal mail				
Face to Face communication				
Communication via third party				
Group meeting				
Notice board				
Web site				
Knowledge Network				
Internal TV				
SMS				
If other: specify				

Q6)What sort of communication (and how often) your students (you think) use in case they have missed out some information

	1	2	3	4	5
Student - student communication	☐	☐	☐	☐	☐
Student - teacher communication	☐	☐	☐	☐	☐
Student - administration communication	☐	☐	☐	☐	☐
Student - school management	☐	☐	☐	☐	☐

Q7) how do you rate communication form according to ease of use:

Media	1	2	3	4	5
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (personal)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
Internal mail	☐	☐	☐	☐	☐
Face to Face communication	☐	☐	☐	☐	☐
Communication via third party	☐	☐	☐	☐	☐
Group meeting	☐	☐	☐	☐	☐
Notice board	☐	☐	☐	☐	☐
Web site	☐	☐	☐	☐	☐
Knowledge Network	☐	☐	☐	☐	☐
Internal TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
If other: specify	☐	☐	☐	☐	☐

Q8) how do you rate communication form according to its effectiveness, i.e. how sure you are that recipient receives message and interprets it in the intended way?

Media	1	2	3	4	5
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (personal)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
Internal mail	☐	☐	☐	☐	☐
Face to Face communication	☐	☐	☐	☐	☐
Communication via third party	☐	☐	☐	☐	☐
Group meeting	☐	☐	☐	☐	☐
Notice board	☐	☐	☐	☐	☐
Web site	☐	☐	☐	☐	☐
Knowledge Network	☐	☐	☐	☐	☐
Internal TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
If other: specify	☐	☐	☐	☐	☐

Q9) how do you rate communication form according to their security and protection of integrity level?:

Media	1	2	3	4	5
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (personal)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
Internal mail	☐	☐	☐	☐	☐
Face to Face communication	☐	☐	☐	☐	☐
Communication via third party	☐	☐	☐	☐	☐
Group meeting	☐	☐	☐	☐	☐
Notice board	☐	☐	☐	☐	☐
Web site	☐	☐	☐	☐	☐
Knowledge Network	☐	☐	☐	☐	☐
Internal TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
If other: specify	☐	☐	☐	☐	☐

Q10) Rate the time-saving effect of following communication forms?

Media	1	2	3	4	5
Telephone	☐	☐	☐	☐	☐
Mobile phone	☐	☐	☐	☐	☐
e-mail (provided by school, part of "KN")	☐	☐	☐	☐	☐
e-mail (personal)	☐	☐	☐	☐	☐
Post	☐	☐	☐	☐	☐
Internal mail	☐	☐	☐	☐	☐
Face to Face communication	☐	☐	☐	☐	☐
Communication via third party	☐	☐	☐	☐	☐
Group meeting	☐	☐	☐	☐	☐
Notice board	☐	☐	☐	☐	☐
Web site	☐	☐	☐	☐	☐
Knowledge Network	☐	☐	☐	☐	☐
Internal TV	☐	☐	☐	☐	☐
SMS	☐	☐	☐	☐	☐
If other: specify	☐	☐	☐	☐	☐