

Stimulating co-operation in Interorganisational Relationships

An Investigation in the Gradation of Information Needs of a Virtual Organisation

Petra Bosch-Sijtsema

**Master thesis in business administration
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Summary

Title

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Purpose

The purpose of this thesis is two-fold. First the researcher wants to investigate the gradation of information needs, in order to make a classification of important information and communication aspects of the focal organisation EnerSearch. Secondly, in order to state a classification of information, a vocabulary is developed that could help actors to understand the situation under investigation.

Method

The methodology used is partly an action research methodology, where the researcher plays an active role in interpreting and understanding the situation together with the actors of the focal organisation. The research exerts from a hermeneutic perspective, where activities in the focal organisation are interpreted and concepts are developed that can help actors of the investigation, to understand their situation. For the investigation a case study is taken and the researcher has an active role in the case study.

Conclusion

The found data is summarised by using ideal types that characterise persons in the focal organisation. The ideal types used are: clients (members of the management and financiers), involved and individualists (both operating core). These three groups have different needs of information, communication and objectives. With help of these groups a classification of information distributed in the organisation is made, based on a division between: information based on destination (to whom the message is sent) and content (what is the content of the information sent). This division is used in order to find the most suitable media that could be used for transmitting this information and this is done with help of the information richness theory of Daft & Lengel (1990). By distributing information and by communicating with each other, one could also state that co-ordination is partly stimulated with these results. Furthermore, the results found can be implemented in an information system that is adjusted to the requirements of the participants of the focal organisation. For this reason a primitive design of an information system is proposed that could support the aforementioned classification and that could support communication and information distribution in the focal organisation.

Acknowledgements

The thesis is a master thesis, written for the University of Karlskrona/Ronneby in Sweden, in the field of business administration with a specialisation in information technology. Last year, I received my bachelor degree in *business informatics* in the Netherlands (my home country) and I gained a bachelor degree in *business administration* of the University of Karlskrona/Ronneby. The combination of information technology and organisational change is my main interest and the plan is to continue in this area as a PhD student.

I would like to thank a number of people, who helped me while writing this thesis. First, I would like to thank the organisation that is used as a model for the case study. Most participants of the organisation EnerSearch, and especially the CEO, Hans Ottosson, were very enthusiastic about the subject and were willing to help gathering information and taking interviews. Furthermore, I would like to thank all participants of the project ISES, who were willing to co-operate and to answer questions.

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I hope you will enjoy reading this thesis.

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1 Introduction

How can one improve communication, co-operation and information distribution between the geographically distributed members of the organisation EnerSearch?

This was one of the questions asked by the organisation EnerSearch AB, when they invited me to perform an assignment in their organisation. The assignment within EnerSearch started around May 1996, and tries to map information and communication problems within the organisation. The organisation EnerSearch AB consists of several independent partners, who combined their skills and experience in order to produce research results. Within this organisation members from different organisations, with different backgrounds and competencies are combined and work together to achieve a common goal. The main communication and information distribution problems occur from the fact that the members are geographically distributed and come from different disciplines and backgrounds (they often do not use the same vocabulary or even language to communicate). In this investigation, the problems concerning information and communication in the organisation are investigated, in order to develop a vocabulary that contains the investigated situation and that can help participants to understand their situation. The thesis is divided into two larger parts I and II which contain the following. Part I contains section 2, 3, and 4 and pays attention to the problem discussion and methodology choices made. Part II includes the other chapters and deals with the found results. The organisation EnerSearch AB is investigated in more detail and in section two (*the focal organisation*) the organisation is described. However, this does not mean that similar organisation structures might cope with similar problems. Therefore the thesis could also be advantages for them.

In the third section the theoretical frame of reference and the problem formulation (*problem and theory discussion*) are discussed in more detail. Theory mentioned in this section is viewed in order to gain an understanding of the problem under investigation. However, parallel with the investigation, theory is investigated that could be of use for the interpretation of data found. The problem formulation deals with problems occurring in strategic alliances and virtual organisations that have distributed participants. Furthermore, participants communicate with help of information technology and this often leaves out informal communication and non-verbal aspects. Within the focal organisation problems arise in communicating and distributing information to participants and this affects co-operation that was aimed for. Therefore, the research question is how one can support communication and co-operation in the focal organisation EnerSearch. This is done by investigating and classifying the information needs available in the focal organisation.

In the fourth section (*methodology*) the methodology used in this investigation is mentioned and an action research method is partly chosen to perform the research. Important is that the researcher tries to understand the situation under investigation, by interpreting data collected from interviews, conversations and observations. This interpretation contributes to developing certain language concepts (vocabulary) to help participants of the focal organisation to understand their situation. Furthermore, the researcher has an active role in the research and subsequently affects research results through this role. The investigation is taken from an inductive perspective where, with help of a certain theoretical understanding, practice is investigated in order to generate theory or vocabulary. In order to summarise the data found in practice three ideal types are created that comprise the different attitudes within the organisation. These ideal types are: the client, the involved and the individualist and they all have their own characteristics that make them unique. These ideal types are used within the interpretation of data and also in the presentation of an alternative solution.

After the methodology a short summary of the data found in the focal organisation is presented in section five (*differences in opinion*). This summary is presented, so that the reader can understand the situation under investigation better and so that the reader can follow the process of interpretation. Within the summary some of the occurring problems are mentioned in more detail and differences between participants are described. These differences are divided into three ideal types in section six.

As mentioned above, section six (*ideal types*) deals with describing the three ideal types found in the focal organisation. The ideal types of the client, the involved and the individualist are developed and their characteristics are described. The client is often the one who sponsors the project or who steers part of the work. The involved and individualist are often part of the operating core, who actually perform the research ordered by the client. While the involved is interested in co-operating and learning from other participants, the individualist is only concerned with the personal assignment and no co-operation is required. The information needs of these three groups are discussed with help of the data found in the focal organisation. Certain opinions in the operating core could be combined, e.g. the media used for communication. Therefore, these aspects are dealt with together.

In section seven (*classification*) a classification of the found information needs is made and two alternatives are presented that could be used within the focal organisation. The first alternative deals with destination and content information types. Where destination deals with to whom the information is sent and content deals with what the message contains, e.g. information about the product. For this classification, the destinations of individual, global, and external information are made and the contents are described as product, process, financial, logistic and social information. Social information is a class on its own, since this comprises social and informal communication and information distribution. The second alternative is taken from the ideal types mentioned above and the content information types. A matrix of examples of what kind of information could be distributed is presented.

These classifications are later used in section eight (*information and communication technology means*), in order to present a proper media for distributing several kinds of information types and subsequently communication types. For this purpose the theory of information richness of Daft & Lengel (1990) is used as a basis and both classifications are discussed with help of this theory. After defining what kind of richness media should have when using specific information types, the most popular information technology means of current organisations are discussed in order to understand their abilities. With help of the latest technologies and the classifications made above, a primitive design for an information system that could support based on the classification is stated.

The last section (*final remarks*) of the master thesis presents some guidelines for the focal organisation. These guidelines comprise especially visionary and strategically decisions that should be made before a specific information system, that could solve the information distribution problems, can be implemented. Furthermore, a short evaluation of aspects within the investigation is mentioned, where difficulties and failures within the research are discussed. The appendix mentioned after the bibliography mentions theoretical perspectives and literature that are used within the interpretations of the data found. This theory is investigated parallel with the research and is sometimes referred to in the thesis, but for those interested detailed information can be found in the appendix.

Part I Problem discussion

2 The focal organisation

In order to understand the organisation investigated in the thesis, a more detailed description is presented. After this description of the focal organisation, a discussion of the problems occurring in this organisation is mentioned and related to literature.

As mentioned before, the focal organisation of the research is the organisation EnerSearch AB. EnerSearch was founded officially in May 1996, and one can say that the organisation is still in a starting phase. EnerSearch is a research organisation consisting of large research projects. The organisation performs research and development on large distributed micro-processor infrastructures, that support open distributed information systems for the utility branch. The organisation has for the moment only one large research project, but within soon an additional research project will be started. EnerSearch AB is a co-operation of IBM Utility (50% owner) and Sydkraft AB the energy supplier who's market is mostly in southern Sweden (50% owner). Besides the two owners, EnerSearch also has a number of sponsors that support the research in several projects with money, equipment and, sometimes, knowledge. These sponsors are ABB Network Partner, PreussenElektra (Germany), Electricité de France (France), Ronneby Kommun, Ronneby Energi AB and IT Blekinge. The research within EnerSearch is performed in co-operation with a number of universities, e.g. University of Karlskrona/Ronneby, Lund University, Linköpings Technical University, Chalmers Göteborg, Twente University (NL) and Denmark's Technical University (DK). The members that perform research in the projects are PhD students and consultants and most research members are supervised by senior researchers of the above mentioned universities. Furthermore technicians enable the research by maintaining and implementing information technology.

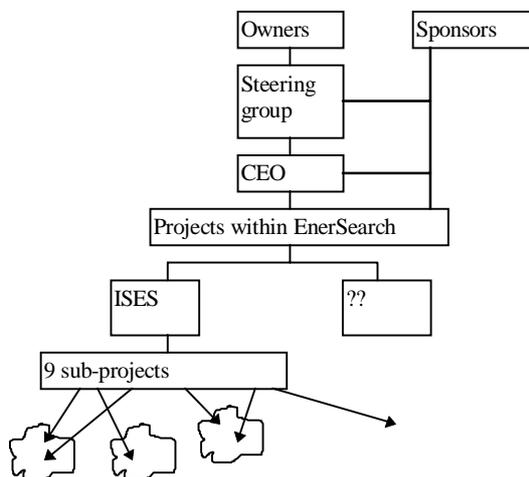


Figure 1: EnerSearch AB, including several short term projects (e.g. ISES) connected to other organisations or other research projects.

The energy market in Sweden has recently been deregulated and competition between different utility companies increased drastically. Therefore, Sydkraft AB decided to combine its strengths with IBM Utility to investigate in long term research, in order to design new technical applications and customer solutions on the long run, beneficial for both partners. This is a rather new approach within the utility branch and it is increasing in popularity. A large number of

organisations were interested in joining the research within EnerSearch as a financial sponsor. Competitors from different countries, e.g. Germany and France, who already had similar future ideas, invested in the research project and so did several companies that work close together with the utility industry (e.g. computer branch). In such a way the sponsors could make use of results of a long term research on several aspects of novel ideas and designs in the utility market, without doing the research themselves. Furthermore, the idea of combining resources between a utility and computer company, that is sponsored by several competitors within the same line of business, is a rather new idea within the utility market. The Scandinavian countries are one of the first countries that deregulated their utility market and therefore several European countries are interested in the future of the utility market in Sweden. Subsequently, they are interested in the results and research progress of the co-operation within EnerSearch.

The ISES-project

The current research project within EnerSearch is called *ISES* and stands for *Information/Society/Energy/System* in Blekinge (county in southern Sweden). ISES does research, analysis and development in order to find solutions and functions for the distributed needs of utility companies and customers, so that several applications are developed and the needs of global communication with a network are combined. The ISES project is a temporary project of three years, where different partners and competencies are combined. The project is divided over a number of sub-projects, and these sub-projects (nine in total) are executed by several project members. These project members are PhD students, consultants and supporting technicians who have a senior researcher (for the PhD students) or company (utility or computer company) as their supervisor. The majority (seven projects) of the sub-projects focuses on technical solutions, while only two projects work on business administrative activities and organisational theory. The combination of sub-projects is seen as a knowledge platform that can be used for several companies and market applications, in order to implement and maintain a two-way communication network via the electricity network towards the customer. EnerSearch tries to sell the knowledge and research ideas to interested partners. A summary of the nine sub-projects within the ISES project can be found in the appendix of this thesis.

Within the ISES project the main question, which is the basis of the research project is: what influence does information technology have on the future society and how can the utility market with help of information technology gain a better communication with its customers. Within the ISES project it is important to gain synergetic effects and management hopes to achieve this with help of a network. This common network should combine several public and private communication and information networks, i.e. the electricity company network, the electricity low voltage network, the municipality network, internet and other personal networks. With this combination of networks, companies, customers, the municipality and EnerSearch can dispose over a large amount of information that can be used to reach synergetic effects. ISES envisages a shift of business focus from products and production to customer needs and services. The change of business focus, and the deepening of customer relations, is enabled by *an interactive two-way electronic communication between the customer and utility provider*. Another aspect that is important in the vision of ISES is, *the integration of information structures with other public and/or private information networks in order to be competitive in old as well as in new business areas*.

Above the organisation and the project ISES are discussed from an abstract dimension. It is important to understand the abstract dimension, so that the reader understands the context of the research performed in the project. However, for this thesis a more concrete dimension or organisational level of the focal organisation is important, since most problems of co-operation,

communication and learning abilities are situated on this level. Therefore the focus of the research is mostly on the organisational level of the focal study object. Within the ISES project, the members of the sub-projects are geographically distributed and work for a large degree individually. However, in order to achieve the common goal of a two-way communication network, the sub-projects have to combine their results and ideas and the distribution aspect only complicates this matter. Furthermore, since the organisation is still in a starting phase, members have difficulty in knowing what role to play in the organisation. Within ISES there is a communication problem, since people hardly meet in person and informal communication is lacking. Furthermore, not all members have the possibility to communicate via information technology with each other, and hardly no applications support e.g. sharing of documents or ideas between the project members.

3 Problem and theory discussion

In order to understand the situation of the organisation, several theories are discussed in order to gain an understanding of the organisation structure and its characteristics. The theoretical perspective that is used for this investigation is partly based on the perspectives available within interorganisational relationships and strategic alliances. The focal organisation EnerSearch could be viewed as a strategic alliance and therefore theory about strategic alliances is presented, so that the reader understands implications of such an organisation form. This theoretical perspective is partly described before the investigation started, in order to understand the background situation. However, a large part of it is developed during the investigation parallel with the research done in the focal organisation.

3.1 Strategic alliances and networking

Currently, organisations live in a rapidly changing period where environmental aspects are altering fast. Globalisation of the markets of organisations have placed the environment in a different perspective and the role of the customer changed drastically. These rapid changes in the environment of organisations have caused a change in organisational perspective. The organisation is viewed as a flexible and organic system rather than a hierarchical or mechanical system. Within the current environment, the functional divided and hierarchical organisation structure is viewed as too rigid, too slow and it is too difficult to adjust the organisation quickly to changing circumstances. The focal organisation can be viewed as a flexible organisation structure, where the technical core is diminished and boundary spanning roles are expanded (Larsson et al. 1996). Furthermore, employees have a high degree of knowledge and perform a number of tasks, instead of one specified task as within a traditional organisation structure. The focal organisation is created in order to increase knowledge and competence with help of co-operation with other partners. Several authors have pointed out why more and more organisations try to alter their organisation structure or start to form interorganisational relationships with other organisations (Hasting 1993, Alexander 1995, Oliver 1990, Hamel 1991). This thesis focuses on an organisation co-operating with other independent partners, for this reason strategical alliances and networking organisations are discussed in more detail. Most co-operations are based on economical or social exchanges in order to increase each other's results. The relationships between the partners continues as long as all partners can profit from the co-operation.

Some of the structural changes in co-operating organisations are a radical decentralisation of tasks, power and responsibility. Especially, the employees gain more responsibility in order to make their own decisions and increased interdependency arises. In the changing environment, organisations start to co-operate rather than to compete, so that a joint competitive strategy is

formed between different partners. In order to manage this organisation, a distributed leadership is suggested (Hasting 1993). This means that responsibility is distributed among people, requiring of them considerable maturity and leadership quality. To form strategic alliances with other organisations and in order to co-operate, organisations have to cross boundaries. These boundaries are not only physical boundaries, but also personal, hierarchical, cultural and practical boundaries. In the focal organisation, people with different backgrounds, cultures and from different countries co-operate and should work together. Therefore, intense communication between people is important in order to reach the stated common goals or strategy. For this communication, direct relationships and information sharing between individuals, irrespective of their role, status, level, function, culture or location should be achieved.

Strategic alliance

A strategic alliance is a combination structure consisting of new and disbanded boundaries, co-operation and competition at once. The forming of a strategic alliance can be viewed as a renewal process for the partners involved, where new rules are developed between the partners, in interaction with each other. This means that an involved organisation's stated boundaries and hierarchical structure between partners is no longer valid. Partners have to define new management philosophies, organisation structures and patterns of interaction and co-operation between the partners. An alliance may not only be a means for trading access to each other's skills (quasi-internalisation), but it can also be a mechanism for actually *acquiring* a partner's skills (de facto internalisation) (Hamel 1991). Hamel states that global competition highlights asymmetries in the skills endowments of organisations. However, collaborations might provide an opportunity for one partner to internalise the skills of the other, and thus improve its position on the market both within and without the alliance. A negative view of strategic alliances is presented by (Parkhe 1993) who defines the alliances as voluntary interfirm co-operative agreements, often characterised by inherent instability arising from uncertainty regarding a partner's future behaviour and the absence of a higher authority to ensure compliance. The author discusses that this self government complicates the aforementioned relationships, since mutual co-operation is not automatic.

Networking organisations

Not only the notion strategic alliance is used for interorganisational co-operations, but also networking is mentioned (Hastings 1993). Networking is often used as a social process of linking and connecting individuals tighter. Others use the notion to talk about assembling coalitions or groups in order to achieve tasks. From an organisational theorists point of view the networking organisation can be described in terms of which different organisations become more interdependent on one another. For a network to exist, there must be at least a partial overlap in domain (e.g. synchronisation in terms of time). Furthermore, for a network to emerge and remain stable there must be a certain minimum of domain consensus among participants even though domains are subject to change (Thorelli 1986). The relationships within networking organisations have various manifestations and comprise four elements: mutual orientation, the dependence that each has upon the other, bonds of various kinds and strengths, and the investments each has made in the relationship (Easton 1992). These elements strongly interrelate and are preconditions that should be taken into account when forming a network. The purpose of networking within organisations is to break down boundaries, in order to create quick and open person-to-person communications. By breaking down boundaries, organisations can respond rapidly and flexible to changing circumstances. The purpose for specific networks of individuals can be to focus on activity, know-how and people with similar interests. Networks will usually have a social dimension characterised by patterns of individual social contacts. They may have commonly held beliefs about the basis of social activity within the network (Easton 1992). A more general term

for co-operating organisations is interorganisational relationships, IORs (Oliver 1990), this notion has been around for several years now, and later notions like networking arose. Alexander (1995) defines an interorganisational network as a loosely coupled system with some more stable subsystems, e.g. an interlinked set of community organisations with a power elite as its subset. These networks include alliances, federations and corporate networks. Alexander (1995) states that interorganisational co-ordination has become increasingly widespread as the scale of undertakings increased, this limited the potential of independent action by a single organisation.

Interorganisational relationships

The notion interorganisational relationships (IORs) is often used to imply several sorts of interorganisational co-operation, mandatory or voluntary (e.g. strategic alliance and networking are examples of voluntary co-operations). IORs are relatively enduring transactions, flows and linkages that occur among or between an organisation and one or more organisations in its environment (Oliver 1990). Literature on IOR is broad ranging and heterogeneous. However, Oliver (1990) tries to generalise six contingencies explaining the reasons why organisations choose to enter into relationships with one another. Each determinant is a separate cause of relationship formation, but the contingencies may interact or occur currently when establishing an IOR. The contingencies described by Oliver (1990), are mentioned briefly in this report, since the reason for co-operation also affects the co-operation strategy between the partners. 1) *Necessity*; linkages are established in order to meet necessary legal or regulatory requirements. 2) *Asymmetry*; IORs are founded to exercise power or control over other organisations or each other's resources. 3) *Reciprocity*; relationship formation is based on reciprocity, emphasising co-operation, collaboration and co-ordination among organisations, rather than domination, power and control. IORs occur for pursuing common or mutually beneficial goals or interests. 4) *Efficiency*; in order to improve an organisation's internal input/output ration efficiency can be a reason for co-operation. The efficiency reason for an organisation to establish an IOR is often internally oriented. 5) *Stability* (predictability); which is characterised by an adaptive response to environmental uncertainty. 6) *Legitimacy* has been cited as a significant motive in the decisions for organisations to interconnect. Institutional environments impose pressures on organisations to justify their activities, these pressures motivate organisations to increase their legitimacy in order to appear in agreement with the prevailing norms, rules, beliefs or expectations of external constituents (Oliver 1990). The focal organisation EnerSearch is a combination of resources based on reciprocity, in order to obtain synergism in technology and information sharing. Furthermore, not only reciprocity can be seen as the contingency or reason for forming an IOR within EnerSearch. Furthermore, an asymmetry reason can be viewed. With the asymmetry reason the partners of EnerSearch want to increase market power and become more competitive in the deregulated utility market in Sweden. However, since the internal organisation level is investigated, the main concentration is on an interorganisational relationship with others in order to exchange resources and knowledge.

Virtual organisations

The above mentioned organisations are the predecessors of a new term in organisation theory, the virtual organisation. The virtual organisation can be viewed as a co-ordination between several independent partners, who share their resources, skills and knowledge in order to produce a "best" customer solution (Davidow & Malone 1992). Although the virtual organisation might seem another name for the aforementioned organisation structures, the difference with this organisation type is that people are connected via information technology. With help of new developments in communication technology, e.g. e-mail and internet, partners from several countries or places can combine their strengths to produce a service or product. The virtual organisation could be viewed as the modern term for networking organisations or strategical

alliances. From literature, it is not very clear where these organisation types differ and especially the term networking organisations and the virtual organisation term are used in the thesis.

So far, only a rather abstract level of strategic alliances and networking is discussed. The focal organisation EnerSearch is viewed as a strategic alliance on the top level. With the top level the owners of the organisation and the sponsors are meant. The top level decides on strategy and common goals of the research going on in the projects. However, on the lower level one could speak of a networking or virtual organisation where several individuals (mostly PhD students) combine their skills and knowledge in order to produce research results for the alliance partners and sponsors. Since the focal organisation has a number of problems on the lower level in the organisation in communication and information distribution between the individual members, this lower level is investigated in more detail. Within EnerSearch two partners have joined their resources (sharing finances and equipment) in order to design a product in the long run. Furthermore, several sponsors are interested in the results and support the research with financial aids. However, the partners and sponsors do not perform the research. For this research other experienced members are hired. Within EnerSearch these members work within the large project ISES, with a common goal. However, the individuals all have their own target and research field. Together the members could learn from each other's experience and knowledge and by combining their ideas a common goal of a two-way communication network via the electricity network should be achieved. For this reason the lower level of the organisation is discussed in more detail and project teams (as within the ISES project of EnerSearch) are presented.

3.2 Project teams

The organisation EnerSearch can be viewed of as a co-operation between one or more independent partners who combine their resources, in order to produce a two-way communication means via the electricity network. The partners combine their resources in order to learn from each other's skills and knowledge. With help of this knowledge, organisations can work towards a common goal and learn from their mistakes and failures in order to become more effective. For achieving the aforementioned objective, EnerSearch works within projects (both long and short term projects) or teams. In these projects e.g. ISES, people with different skills are combined and together a common goal is created. This organisation form is sometimes described as the virtual corporation (Davidow & Malone 1992) or the interorganisational networking company (Alexander 1995) (within this report the term networking organisation is used for the lower level of the organisation). An aspect that has hardly been mentioned yet, is the fact that participants from different disciplines and backgrounds try to share their competencies. Furthermore the project members within the projects of EnerSearch are distributed geographically. Due to technological developments, more and more people can work from whatever place they choose and especially in loose organisation structures, it is common that not all members are located at the same place. Only limited literature about interorganisational co-operations and geographical distributed members is available. The distribution of members within a project e.g. ISES, in which several skills are combined, implies several aspects. Members of the project do not meet regularly since they are often spread around the world/country. Therefore a lot of information and communication does not take place via personal contact, but rather with help of information technology, which leaves out a lot of informal, personal and tacit aspects useful for the process of reaching a common goal. Furthermore, members come from different disciplines and backgrounds and want to communicate often in order to co-operate. However, informal communication seems important for co-ordination in the face of uncertainty and equivocality (Galegher et al. 1990). In every organisation there is novelty, unexpectedness and uncertainty that are often components of what appear to be routine procedures.

In traditional functional divided organisations, a project team often consists of employees from one organisation. Project work could be defined as combining available skills into a team in order to produce a product. Within the traditional projects the project members have a similar organisational background, since they all work for the same organisation. The employees know the organisation and they are often familiar with routines and rules that are applied within the organisation. In functional organisations, different parts of the organisation have specific vocabularies they use to communicate about certain activities (Daniels 1994). This vocabulary is translated to more general situations. However, it is management's task to have the shared concept and shared vocabulary, and management could communicate this to departments. Often there is competition between several departments and this difference in vocabulary (with vocabulary is meant, e.g. similar definitions of notions) only intensifies this competition. However, within the focal organisation, participants should work together in order to be more effective and produce better customer solutions, so that the organisation and the partners involved become more competitive and survive in the changing environment. Furthermore, another aspect with the focal organisation, is that most project members (the members that perform the research) come from other independent companies with their own routines, rules, structures and often their own company culture. Therefore it might be difficult to co-operate, because certain aspects are interpreted and defined differently. One can state that the project members within the EnerSearch organisation could have difficulty in using the same "vocabulary." With the same "vocabulary" is meant, that members in an organisation create a certain understanding about terms and concepts useful for their research. Often a special vocabulary is invented that is only used within one project in order to describe certain aspects. Research has shown that it is important for members of a project to find a 'common' vocabulary which every one can understand and in which one defines matters in a similar way. This does not imply that no differences in opinion are available, only that people can understand each other. Favourable in an organisation is the situation where people have different ideas in order to discuss this and increase knowledge. One can summarise the problems and difficulties within project teams within distributed organisational co-operations, e.g. the ISES project of EnerSearch, as follows:

- Often, members from different disciplines and organisations have conflicting expectations, different and sometimes conflicting backgrounds, cultures and vocabularies;
- Members are sometimes worlds apart, because of the geographical distribution, and it is difficult to meet regularly in person;
- Because of the geographical distribution aspect, there is less personal contact and less informal contact which could influence the effectiveness and innovativeness of the organisation;
- Members should be willing to share their knowledge and skills with others in order to learn from each other's experience.

In order to achieve an effective group working together and striving towards the same goal, people have to meet and discuss matters with each other (Sproull & Kiesler 1992, Galegher et al 1990). These authors claim that it is very important that the members of a project have, besides formal contact, also informal communication with each other, this means not only verbal but also non-verbal contact. The body language (non-verbal contact) can make clear if someone is motivated or if the person understands what is happening. Furthermore, the aim in the focal organisation is that members learn from each other's expertise and together find new ideas and means to solve problems. Only combining skills and resources of different organisations might not be enough to survive for an organisation in the future. Several authors state that an organisation could increase its learning capacity by using organisational learning (Argyris & Schön 1978, Nonaka 1994). Especially within an interorganisational co-operation as e.g. the

focal organisation, organisational learning could become a factor in order to become more successful and flexible to changing circumstances than other competitors. This learning objective can be viewed as interorganisational learning, and members of the focal organisation could benefit from meeting each other regularly. The aim of the focal organisation is that through combining skills, resources and knowledge a synergetic effect arises and new ideas and products are developed. The different experiences and skills of members of the project can, combined, increase learning abilities of the project team. A problem with combining experiences and skills is that often a lot of knowledge is tacit knowledge and it is difficult to communicate this to others. One way to transfer tacit knowledge to others, could be a close (personal) co-operation between the members so that one can show one's experience in practice e.g. by solving and discussing problems together. The learning aspect of organisations is rather interesting, but is not further discussed in this thesis. This thesis concentrates on finding solutions for the communication and information distribution problems in the focal organisation.

3.3 Communication in a virtual organisation

The focal organisation is a co-operation of several organisations in order to share knowledge and resources, so that a specific objective can be achieved. Furthermore, in this research concentration is put on the fact that the members of the focal organisation work within project teams where several skills and experiences are combined and where members are distributed geographically. The distribution aspect complicates co-operation and working within a group to a certain degree, since members do not meet regularly. In traditional organisations with one location, people meet in hallways, meeting places or on social events. This is not the case with a distributed organisation, while members have difficulty meeting each other regularly, since they are spread over the country and since there is no single location to meet each other. Furthermore, not only formal communication and information distribution is complicated by this geographical distribution, but also social events and an informal organisation structure are diminished. In traditional organisations a common culture can stimulate the objective of the firm and the feeling of belonging to one group of people. However, within the organisation EnerSearch members often work individually and this complicates building a common culture or striving for a common goal within the team or project group. The self-interest orientation of each partner, can lead to actions that are individually rational but that are not suitable for the common objective of the project (Parkhe 1993).

Therefore, in order to facilitate co-operation in the focal organisation, the members should be supported in order to communicate. For this reason, communication media and informal communication are discussed in more detail. The communication in the focal organisation, is often done via information technology (e.g. e-mail and WWW). A lot of research has been done in order to see if information technology improves communication and information distribution. However, a number of researchers state that by sending information via e.g. mail tools, a lot of non-verbal aspects, e.g. tone of voice, signals and facial expressions, are lost and often people have no possibility to interact or to interrupt the messages (Hinds & Kiesler 1995). Subsequently, one can state that it is rather difficult to transfer tacit knowledge via information technology. Tacit knowledge has a personal quality, which makes it hard to formalise and communicate. Tacit knowledge is often deeply rooted in action, commitment and involvement in a specific context (Nonaka 1994). In order to obtain the tacit and explicit knowledge, an informal community of social interaction is important (Nonaka 1994). Within the organisation EnerSearch this informal community is hard to find, and so is social interaction.

Informal communication

An investigation performed by Galegher et al. (1990) on informal communication (casual, not formal or planned) in a research and development department of an organisation, proved that the relation between physical proximity and informal communication is very tight. They claim that informal communication is distance sensitive and it happens most often with people who are in physical proximity. The authors state that in a research department, co-ordination and communication is required for collaboration. Secondly, in a research department, one deals with uncertainty in both *production* and *social* relations. With production is meant the novelty of the research. Social relations entail uncertainties in establishing trust in potential and actual research collaborators and in defining a division of labour. The authors claim that an increase in informal communication could affect one's perception of co-workers, accurate in judging them and one starts to get to like co-workers personally. The authors discuss the fact that the communication channel itself may partially determine the formality of a communication event. Face-to-face contact and telephone are by their nature more interactive and richer than a computer system, and as a consequence they are more informal. Formal communication tends to be used for co-ordinating relatively routine transactions within groups and the organisation. While informal communication is used for non-routine activities and creative problem solving. Since the focal organisation suffers from communication problems and especially a lack of informal communication is detected, the outcomes of the above mentioned investigation are interesting for the research.

3.4 Information richness

Since, in the distributed projects within EnerSearch, communication and information distribution is rather important in order to co-operate, the media through which one communicates is an important factor in the research. The aforementioned investigation of (Galegher et al. 1990) actually refers to the information richness theory of (Daft & Lengel 1990). These authors claim that the media used to transfer a message influence the richness of the message. The authors define a model for *information richness*. Although their model is an approach to managerial behaviour and organisation design, their basic ideas can also be applied to this investigation. They claim that on one hand organisations have to cope with confusion arising from both the environment and internal differences and on the other hand organisations have to create an acceptable level of order and certainty. This structure and clarity is important to provide direction, procedures, clear data and decision guidelines for participants. This can also be exemplified by the fact that organisations continually must balance between exploitation and exploration in order to survive (March 1991). Exploitation includes aspects like refinement, efficiency, selection. Exploration captures terms like risk taking, experimentation, flexibility, discovery and innovation. Success of this balance is based on the organisation's ability to process information of appropriate richness to reduce uncertainty and clarify ambiguity. Information richness is defined as the potential information-carrying capacity of data. Communication media used in organisations determines the richness of information processed and a hierarchy of richness is presented by (Daft & Lengel 1990). This hierarchy differs in feedback capability, communication channels utilised, source and language. Other researchers, like (Hinds & Kiesler 1995) suggest that information richness may involve multiple dimensions like bandwidth and synchrony. With bandwidth they refer to the ability to exchange information from all human senses: sight, smell and hearing. Secondly, synchrony refers to whether people can communicate at the same time, e.g. telephone is synchronous, since people can talk to each other at the same time. From the investigation of Daft & Lengel (1990), it became clear that face-to-face communication is the richest form of information processing, since it provides feedback possibilities and is personal. They claim that each medium used for information transfer utilises differences in feedback, cues and language variety.

Rich media, e.g. face-to-face is important for complex organisational topics, low media is more suitable for routine and simple topics. Daft & Lengel (1990) mention the importance of oral communication, especially face-to-face, since this is reflected in the impact of non-verbal signals. Eye-contact, body-movement and facial expression communicate meaning beyond the verbal message. In an investigation only seven percent of verbal language was transmitted, the rest was non-verbal language. Furthermore, the organisational culture and climate are associated with information media. Myths, stories and metaphors are effective means of preserving social and emotional aspects of an organisation. These stories are on the social-emotional side of the organisation and provide participants with history, background and meaning for their function in the organisation. These emotional and social aspects are best transmitted through informal, personal media, since if one would mail a funny story to a person, the emotional and deeper meaning behind it would be lost and the story will only exist of rational facts.

Information richness and organic organisations

Daft & Lengel (1990) state that in organic organisations, people are continually redefining and re-negotiating tasks. The organic structure mentioned by the authors, could well be compared to the flexible structure of the focal organisation. Rules and responsibilities are ill-defined or do not even exist. The authors view the main difference between an organic and a bureaucratic (mechanistic) structure as media richness. The organic structure facilitates communication through rich media, the organisation is learning constantly and external changes are interpreted and translated into new roles and internal tasks. Therefore widespread face-to-face discussion enables continuous interpretation and adaptation to take place. Furthermore, Hinds & Kiesler (1995) claim that media which differ in bandwidth, also differ in how much *social* information they provide. With social information the authors mean a social presence, e.g. the possibility to have direct feedback, so that one can respond directly on certain matters and non-verbal aspects. The authors discuss an argument of Short (1976), that people who must solve non-routine complex problems perform better when communication channels convey "social presence".

3.5 Problem Discussion

Research question

The focal organisation EnerSearch can be viewed of as a strategic alliance or networking organisation. However, a difference should be made between an abstract level of the organisation seen as an umbrella embracing several short term projects, and an organisational level embracing the co-operation and knowledge sharing between participants of the projects. Within this thesis emphasis is put on the last aspect. However, the abstract level is taken into account, since it determines the organisation structure and several organisation rules and routines. The strategic alliance is a co-operation of several independent organisations that combine their skills and resources to produce a product or service. Within EnerSearch this product is research results for the utility market. In order to co-operate participants could benefit from personal communication, but this is diminished by a geographical distribution of the participants working in a project. Furthermore, several different disciplines, backgrounds and nationalities are combined in the project, and participants could benefit from a common vocabulary in order to communicate about several subjects. Participants also communicate often through information technology and this does not always improve the social contact between members. Through electronic communication, several important aspects, like facial expression, personal contact and body movements are decreased. These aspects are not often taken into account when discussing an IOR. The above mentioned aspects of lack on social and informal structures in a distributed interorganisational co-operation also affect the co-operation and synergetic effect that is aimed for in these organisations. EnerSearch copes with problems in the information distribution and

communication and this decreases co-operation within the organisation, since not all members receive the appropriate information at the right time and place, nor have possibility to meet in person regularly. Therefore the following research question is investigated:

How can one support co-operation and communication in EnerSearch?

The above mentioned question is dealt with by investigating communication and information distribution within the focal organisation. However, one should be aware that the focus of the research is more on investigating information distribution aspects than on communication aspects. This is because of a) communication is rather difficult to measure and it is often mixed with information distribution, b) through information distribution also one form of communication is performed, the one of informing people of new developments. This information distribution can be done through different media: personal or written information distribution. As mentioned before, the focal organisation experiences several communication and information handling problems and these problems could be overcome by examining them and stating a possible solution with help of information technology means.

Demarcation and purpose

The demarcation applied in this research is that communication streams and mostly information distribution problems are discussed within the organisation EnerSearch. EnerSearch can be viewed of as a strategic alliance or networking organisation where several partners combine their skills and knowledge. Although organisational learning is a logical following up of the above mentioned discussion, this is not taken into account in the investigation. Organisational learning is a large research area where still a lot of work is to be done. Therefore for the master thesis organisational learning is not taken into account, but will be dealt with in future work. Furthermore, organisational memory is mentioned briefly, but the investigation does not point towards this subject. In order to discuss organisational memory, one should first examine the information handling processes within the organisation.

The thesis actually has two purposes and these purposes are discussed in more detail below. First the purpose in order to help the organisation EnerSearch with its information and communication distribution is mentioned and secondly a presentation is stated about how these aspects could be described. An important aspect in the organisation discussed in the thesis is that participants are geographically distributed. This distribution complicates the information and communication flow within the organisation. Often only technical aspects of how members can send information to each other is discussed in available literature, but social aspects of how this affects communication and understanding in an organisation are not mentioned. Therefore the thesis focuses on what sort of communication and information transfer occurs within a virtual organisation like the focal organisation. One should bear in mind that the focal organisation communicates mainly through information technology and hardly any personal communication is seen. In order to help the focal organisation to understand their situation and to solve some of their problems, it is important that a gradation of available information needs and communication needs is made. This gradation or classification can be used within an information system that could solve some of the problems mentioned in the problem discussion.

A second aspect, important to mention, is how this gradation of information needs is done within this research. For this matter the research focuses on developing a vocabulary (see methodology chapter for detailed explanation). This vocabulary can be used by the members of the focal organisation, in order to interpret and understand certain situations. These situations are in the focal organisation described as the information and communication problems that occur.

Important is that after the development of this vocabulary, which puts the different aspects available to words, is that it should be spread to the participants within the focal organisation. The relevance of this aspect is that actors in the focal organisation, can make use of an approach in order to understand their situation and with help of the created vocabulary they can build a new understanding and can act according to it. The vocabulary will mainly be within the field of information distribution and classification.

Following from the above mentioned discussion, two purposes can be identified:

- 1. To investigate the gradation of information needs, in order to made a classification of important information and communication aspects.*
- 2. In order to state a classification of information, a vocabulary is developed that could help actors to understand the situation under investigation.*

This gradation or nuance is investigated in order to present a recommendation to the organisation under investigation, so that the experienced problems within information and communication distribution are dealt with.

4 Methodology

In this chapter the research methodology applied in this investigation is presented. With methodology is meant, the perspective used within the investigation, the methods and techniques used and choices made in the research.

4.1 Action research

The researcher has partly taken an action research perspective in order to investigate the problems in the focal organisation. However, one should take into account that not the whole action research idea has been used, but only parts of it. Below one can see a model of how action research could look like, although the researcher has not taken into account all the steps presented in the figure below. Important to mention with action research is that the researcher plays an active part in investigating the situation and the researcher tries, together with the participants of the focal organisation, to interpret the data. In order to understand the model mentioned below and to show what kind of steps the researcher has taken, the chosen aspects are mentioned in more detail.

1. *Entry/Background*: in order to understand the background of the situation under investigation, theory about interorganisational learning, strategical alliances and virtual organisations was read in order to gain an understanding of the organisational structure of the focal organisation. Furthermore, interviews and observations were held in the focal organisation, so that problems in communication and information distribution could be specified.
2. *Stimulus for change*: in order to understand the organisational structure, power relations and culture of the focal organisation, the researcher played an active role in the focal organisation. The researcher was part of the organisation and could with help of conversations and observations grasp part of the informal structure of the organisation. This informal structure is important in order to see how this relates to changes in the environment and how participants are willing to change their own situation.
3. *Scanning and Assessment*: through different data collection methods the problems in the organisation could be found (interviews, observations, conversations, literature and other organisational material). With help of this data the problem could be defined more clearly and a design for summarising data could be made.
4. *Diagnosing*: in this step intervention techniques are used in order to see how participants of the focal organisation react to the so far found results. This intervention took place on an annual conference for the whole ISES group, where a presentation was given about the results found so far. Furthermore, a plan was presented which showed some alternatives of how these problems could be solved. After the presentation, informal conversations with participants were held in order to discuss if the results found by the researcher corresponded with the picture of the participants of the focal organisation, this was the case.
5. *Analysis*: After the conference with the ISES participants, the data was analysed further and a vocabulary was developed that could be of help for the members in order to understand and deal with their current situation.
6. *Feedback & Intervention design*: Unfortunately, no time has spend during the process of writing the master thesis to gain feedback on the vocabulary found during the research. However, this process started afterwards in a PhD study done by the same researcher. In this future study an intervention design is made on the long run based on the problems found in the master thesis. Since this is a very long process, the time standing for a master thesis was not enough to develop and implement such an intervention design, but this will be done in the future. Since this last process has not started yet during the writing of a master thesis the last

three steps are not taken into account for this thesis. However, they are presented in a later study.

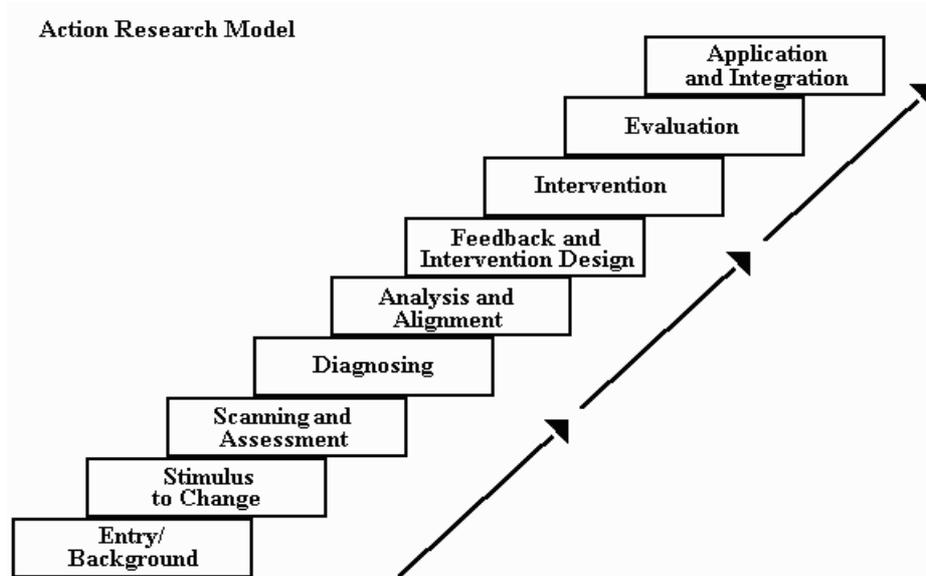


Figure 2: *Action Research Model*, source: Bowling Green State University, Master of Organization Development, Action research model: <http://www.cba.bgsu.edu/gradprg/mod/action.html>

4.2 Hermeneutic perspective

The research is performed from a hermeneutic perspective, where understanding and interpretation are important concepts that imply the subjective touch in the research perspective. Important is to mention that the researcher tries to interpret the actions and reality of people under investigation, here the participants of the focal organisation. The researcher knows that there are several interpretations that can be made, depending on the researcher's personality and background. Often research is done from a positivistic point of view where there is only an objective view of reality and where the researcher can only describe reality in one way. With a hermeneutic perspective the researcher knows that the reality is seen as subjective and therefore the results from this thesis should be considered from a hermeneutic point of view. The focal organisation is viewed as a social system. In this investigation the objective is to generate theory from an empirical study, e.g. the ISES project. For this theory generation, the collection of data and development of concepts is done parallel (Brunsson 1982). The choice of observations is done gradually and with the purpose to make systematic comparisons in order to develop theory and in order to demarcate their validity. Important to mention is, that in this research the aim is to influence and change the social system under investigation (see action research). This means that it is not a problem for the researcher to influence the study object, it is rather a prerequisite of the research work. Within this investigation, the researcher is a part of the organisation as a member in one of the sub-projects in ISES. Therefore, the researcher can influence and support aspects in the focal organisation. This active role could be viewed negative and positive. The positive part is already mentioned above, the negative part is that the researcher could have difficulty in performing certain interpretations, since the researcher could be biased by the organisation and its activities. The theory generated in this research can be viewed as the creation of a particular vocabulary (Brunsson 1982), in which descriptions and understandings of the information and communication problems of EnerSearch are defined. Furthermore, this vocabulary should be mediated to the participants of EnerSearch, so that they can gain a different sight on their situation. This can influence the participant's knowledge to describe and create new prerequisites for the action under investigation.

Within this thesis, the researcher is not able to decide if the actors will use the theory created (vocabulary) in this research. However, one can only offer options on concepts (vocabulary) of a reality and the participants of EnerSearch can choose if they want to apply this to their own situation or not. If one wants to use the developed vocabulary (concept) in the focal organisation, the organisation members have to participate in order to spread and apply the vocabulary. It is not only important when creating language concepts, to see what sort of reality is investigated, but also who is investigating this reality, since different researchers create different theories. As mentioned before, the personality and background of the researcher forms part of the reality picture of the researcher and this influences the created vocabulary. The theoretical frame of reference mentioned in section two, shows part of the theoretical background used by the researcher in order to interpret the situation of the focal organisation. Furthermore, one should be aware of the fact that by viewing theory as a language, implies that a theory does not describe a complete situation. The theory is only a supporting means in order to understand a situation.

4.3 Case study

Within this research the creation of a vocabulary takes a central place. One method in order to develop such a vocabulary is to use case studies. A case study is an investigation on a minor group, this can be an individual, a group individuals or an organisation (Patel & Tebelius 87). The case study is used to investigate the problem area in order to develop and later on spread the created vocabulary. In order to reach a certain validity and reliability with using a case study, the researcher has used multiple sources of evidence (Yin 1994). This means that several methods of collecting data are used and the data found is compared. In this research interviews, observations, conversations and documentation were used in order to increase the validity of the data found.

Another aspect important to mention is the generalisation aspect of a case study approach. Although the focal organisation has a rather specific structure and the data found is directed towards this organisation, the vocabulary developed in the end could also be used by other organisations that are in a similar position. The vocabulary could be seen as a more general theory that could be used by several companies in order to structure and classify their information transfer. The generalisation of found results is sometimes referred to as external validity (Yin 1996).

In this investigation the project ISES of the organisation EnerSearch is investigated. The organisation EnerSearch is a research institution and investigates new market possibilities within the electricity market. The case study consists of a company that can have several large projects going on. At the moment one project, i.e. ISES (Information/Society/Energy/System in Blekinge) is in operation. Within the ISES project the researcher has a facilitator role, this means supporting communication and integration within the project between project members. This role requires a more intervening part from the researcher.

There are several reasons why this organisation has become the focal organisation for the research. First, the organisation is very new and asked for help to solve communication and information distribution problems between its distributed members. Secondly, the researcher is part of a project within the organisation, as a facilitator, in order to increase and stimulate communication and integration between members, so that a common target is achieved. Thirdly, the organisation claims to be an interorganisational co-operation. There is a lot of literature written about organisations that co-operate with independent partners, but still there is a lack in information about how to stimulate co-operation in such an organisation where members with different backgrounds and skills are geographically distributed. This last reason benefits to the

generalisation aspect of this research. Although only one organisation is investigated thoroughly, this does not mean that the vocabulary developed for the information needs could not be used by other organisations. Especially organisations that are placed in a similar situation as the focal organisation and that have similar problems could certainly benefit of the developed vocabulary. Important is that organisations try to adjust the created aspects to their own situation and that they understand the behindlying thoughts of the aforementioned problems.

4.4 Induction

The investigation is taken from an inductive perspective. With an inductive research methodology, the investigation starts with data acquisition from the above stated focal organisation, and out of the found material the researcher tries to make theoretical conclusions. In this thesis the researcher tries to create a vocabulary suitable for the focal organisation, so that the participants of the focal organisation can understand their situation in a different way. One should take into account that the interpretation made is a subjective interpretation of the researcher and is influenced by the background and culture of the researcher in person. In this thesis the aim is to create a vocabulary that can support the information and partly communication that is transferred and received in the focal organisation. With help of this vocabulary, a design for an information systems could be made and this could support the problems faced by the organisation.

The inductive approach is seen as a discovery path. However, the researcher should have some sort of theoretical knowledge in order to understand and refer to matters that happen in practice and relate them to reality. The theory discussed in the problem formulation can be viewed as a frame of reference or perspective of how one views reality. The theory described about interorganisational co-operations and information richness is the frame of reference used in order to support the research and to understand the investigated situation. It was important to understand how virtual organisations and IOR's work in order to understand the organisation ISES. Furthermore, theory about how people can communicate what sort of messages seemed important for the development of a suitable vocabulary. However, a large part of the theoretical framework is developed together with the empirical research. Activities or matters that happen in the focal organisation, sometimes need theoretical basis in order to interpret or understand them. Therefore, during the investigation new theory is used and is discussed when necessary in the proceedings of the thesis.

Combined with a hermeneutic perspective a qualitative research method is applied, in order to gather material useful for the investigation. The qualitative research refers to the inductive perspective, with case studies and subjective data acquisition or subjective analysis methods. By using the qualitative method, the researcher tries to interpret the investigated situation of EnerSearch with help of interviews, observations and conversations. No quantitative material is gathered, only subjective opinions and ideas of participants are investigated and placed into a context. The reason for applying a qualitative method, is that the opinions and interpretations are difficult to measure in quantitative figures.

4.5 Observer, consultant and intervening

The role of the researcher in this research can be viewed as threefold. First the researcher can be viewed as an observer, who only observes changes and aspects in the case study without intervening. This role is seen in the beginning phase of the investigation within the focal study of the ISES project.

Secondly, the researcher is hired by the organisation EnerSearch that is the model for the case study, in order to solve communication and integration problems. In this role one can view a consultant role. In the consultant role the investigator is more active in the organisation than in the observer role and recommends the organisation to perform certain changes. The combination of these two roles makes that on one hand the observer's role demands a certain distance to the information and material gathered. However, the consultant role acquires an active player in the organisation. Furthermore, the consultant role is viewed as an external role within the organisation. This means that the consultant only is hired for solving a specific situation from a neutral and external perspective, while the below mentioned intervening role has a more internal and subjective perspective.

Thirdly, the researcher has an intervening part in the focal organisation. This intervening part can be viewed of as the facilitator role the researcher has obtained in the project ISES. Within this facilitator role, the researcher tries to stimulate communication and integration between different members of the organisation. This intervention has impact on the research results and the language concepts that are the target of the research. This intervening role was always seen as negative from a positivistic point of view. However, with a hermeneutics perspective one claims that it is hardly impossible to investigate a situation without affecting it. Already by being there, and asking questions, people tend to change their habits. Therefore, the intervening role is a natural one within the hermeneutic research approach. Within this research the intervening part is rather large, since the researcher is a part of the organisation and the assignment within the organisation is to stimulate co-operation between members. This active role is often described within action research (see section 4.1), where the researcher plays an active part in the investigation.

4.6 Literature and theory

As mentioned before, the theoretical framework is developed parallel with the empirical research of the case study. Developments in the case study imply different literature and theory acquisition. Literature is used to gather information, especially literature within the field of strategic alliances and networking organisations and theory of communication and information, in order to understand the process of communication and information flow within an organisation. The presented theory is used as an explanation of the results found in the empirical investigation. With help of available literature, theory and empirical data, a vocabulary can be created in order to understand the social situation of the focal organisation.

4.7 Data acquisition methods

For the data acquisition, several methods are used in order to receive the data important for the investigation. Data can be defined as values, or measured values. When this data is put into a context and is given a meaning (Keuning & Epping 1990) it is called information. The methods for acquisition of data are mentioned in detail below, the following methods are used: conversations, interviews, observations and reports of the investigated organisation.

4.7.1 Conversations and Interviews

In order to collect information to describe and investigate the case study, interviews¹ have been held with members and sponsors of the organisation that serves as a model for the case study. Furthermore, conversations were held with the CEO of EnerSearch, (EnerSearch is the organisation that is investigated) and conversations were held with certain sponsors and other interesting parties from the environment of EnerSearch. The interview questions were sent in

¹The interview questions can be found in the appendix

advance to all participants of EnerSearch AB, in order to prepare them on the interview. However, this does not mean that all questions were dealt with during the interview. The interviews held with the members of the organisation were partly *focused* interviews (Yin 1994), this means that a respondent is interviewed for a short period of time, e.g. an hour. The interview were still open-ended interview that assume a conversational manner, however, the interviewer followed a certain set of questions. Not all interviews were focused, some of them could be seen as an *open discussion* between the interviewee and the interviewer. With help of this interview technique, not only informal and personal conversations were held, but with this method also non-verbal language was observed and an interactive conversation was possible. Furthermore, the interviewer could explain certain questions and could discuss other questions that are related to answers of the interviewee. The researcher is aware of the fact that information received from interviews and conversations can be biased and this bias should be taken into account in the investigation. Furthermore, important to mention is that the interviews were taken with two other students. All interviews were taped, but not all interviews were taken by the same persons. This could have impacts on the data found in the interviews. Interviews were held together with two other master students who did a follow-up project in the focal organisation. The advantage with taking interviews is that the data collection is focused directly on the case study topic and it provides perceived causal inferences (Yin 1994). The negative aspect is that the interviews can be biased due to poorly constructed questions and interviewees can answer questions in to what the interviewer wants to hear.

Furthermore, It is possible that the interviewer asks a question with a special tone of voice, facial expressions or other aspects, so that the interviewee already understands the meaning of the question or the opinion of the interviewer. This behaviour of the interviewer could influence the answers of the interviewee. The drawback of interviews is that the information gathered is likely to be full of personal opinions. However, since of all groups in the organisation (project members, leaders, sponsors and the board) interviews were taken, these personal opinions only emphasise certain issues. Since a large amount of participants joined the interviews or conversations these personal opinions can be compared and rationalised. As mentioned before the interviews are not only based on standard questions, but most interviews are open interviews where the interviewer sometimes steers the conversation back towards the subject area.

With help of the organisational scheme drawn by the CEO of the focal organisation and with help of descriptions in documents of the organisation, one can state that the project ISES, (but also the organisation EnerSearch) consists of four groups of roles. In order to gain as much information as possible, all groups are interviewed and observed during the conference. Since most participants of the case study are geographically distributed, it was impossible to interview all participants. The researcher could not get a hold of all participants, but participants who were willing to respond are interviewed and they are mentioned below. However, interviews are held with 18 participants and the roles and the number of interviews taken are mentioned below:

- The members who execute the different projects (mostly PhD students) (8 persons out of 9 interviewed). The members of the project perform the actual research mentioned in the case study's sub-projects;
- The project leaders (5 people out of 7 interviewed). The project leaders support the aforementioned members in their research. Their roles diverse per project member from a supporting towards a supervising and controlling role;
- The managing director (one person interviewed). The CEO from EnerSearch is actually an employee of one of the owners of EnerSearch. The board is important to mention, the board is

the steering committee of the organisation. The board consist of members of the ISES project, e.g. sponsors and some project leaders;

- The sponsors and owners (5 people out of 6 interviewed). There are two owners: Sydkraft and IBM utility, and there are a number of sponsors who are interested in results within EnerSearch ISES project. The sponsors that are interviewed are ABB Network Partner AB, Ronneby Energi, Ronneby Kommun.

The reason for placing the interviewees in groups is based on the conversations and documentation within the organisation structure of EnerSearch.

4.7.2 Observations

Two months after the starting date of the focal organisation a conference was held for all participants of the organisation. The aim of the conference was that all participants learned to get to know each other and they should explain their role and task in the organisation. With this two-day conference a lot of information is collected and conversations are held with a number of participants. Furthermore, information is taken from presentations from the participants. The roles of the participants are observed and discussed in the investigation. The advantage of observations is that one covers events in real time. However, the observation can be selective and participants might behave differently because they are observed.

4.7.3 Documents

Besides literature and theories of virtual organisations and communication and information means, also documents from the organisation EnerSearch are used. These documents consist of the strategy planning and target of the ISES project, general descriptions of all the sub-projects and descriptions of the sponsors. Furthermore, in order to understand part of the research within the sub-projects, several articles and papers are examined. With help of this information less miss-understandings and miss-interpretations are made with the interviews and with the rest of the investigation. In the beginning it was difficult to understand the vision of the project ISES, since it was a very complex and difficult to reach vision. However, after reading detailed information about the sub-projects, a picture is formed that combines all projects into one. The combination of the sub-projects is able to reach the stated vision of the project. The advantage of using documents is that the material can be repeatedly reviewed, it often contains exact data and covers a broad area. On the other hand the collection of data can be incomplete and this influences ones interpretation and the research might not always get access to all the information available. Within the focal organisation the researcher did get access to all information, however, not much documentation was made and therefore an incomplete picture of the organisation was given.

4.8 Ideal Types/ Caricature method

In order to analyse the found data, a specific method is chosen to summarise the found aspects. The summary method is described by Eneroth (1984). The method used in this research is called the method of ideal types or caricature method. In this method one tries to summarise and group data in categories of a certain ideal type of different sorts of activities. One tries to catch a typical character for investigated aspects or persons. One should understand that not all aspects mentioned in the ideal types have all the qualities or characteristics that are connected to the types. However, still one can group aspects and or persons according to these ideal types. The ideal types found in the investigation should exclude each other and should be demarcated strictly. Furthermore, the ideal types should cover the complete investigation area, this means all aspects should be placed under these ideal types, if possible. The found ideal types do not necessarily have to exist in reality and not all cases have to include all characteristics connected

to a specific ideal type (Eneroth 1984). However, on the other side, the ideal type should be developed in such a way that it should be possible to recognise the ideal type in reality. Ideal types are mostly suitable for a static investigation perspective (this means that the focal organisation is interpreted for a certain fixed moment, not for a longer period of time in order to investigate the change process). The ideal types or caricatures chosen in this investigation are the following: the *client* (often the management or sponsors who steer the research), the *involved* and the *individualist* (the last two types often appear in the operating core, the participants who actually perform the research).

There are different participants in the focal organisation under investigation. These different participants all have different roles and different needs for communication and information. Therefore, an ideal notion is defined that fits several participants and their activities within the focal organisation. Furthermore, the information needs of these participants differ to a certain extent and therefore these needs are mentioned in more detail. However, in order to understand the background of the problems mentioned within the organisation, a more detailed description is stated of the data found in the organisation, with help of these aspects ideal notions can be specified and described in more detail.

With help of these ideal types the different characteristics, communication and information needs are discussed in more detail. These needs and characteristics are applied in order to state a classification of information that could be helpful solving the stated co-ordination problems, partly due to information handling and distribution. The classification could be viewed as a new vocabulary that could be implemented in the focal organisation in order to understand their situation and problems. With help of this vocabulary, participants can discuss the situation and can together find several solutions. Furthermore, it is important that participants can reflect over the vocabulary that is created in this thesis, so that the researcher gains feedback on the interpretations done in the investigation.

Part II Research Results

5 Differences in opinion

Below a short summary of the data found from the held interviews and conversations in the focal organisation is presented. This summary is meant to give the reader an understanding about the current situation in the focal organisation. The reader could benefit from this section, since a number of the co-ordination problems in the focal organisation are due to the below described aspects. The problems mentioned below could also be viewed as part of the problem discussion in section three. However, the researcher choose to emphasis these problems, so that the reader was able to follow the process of defining ideal types and creating a vocabulary for the focal organisation. The quotations mentioned in the following sections are anonymously, since they could be sensitive for the interviewed persons and for others. However, in order to see that different participants have stated aspects, the researcher makes use of certain codes which are connected to the different roles participants have in the focal organisation².

Participant's view on the organisation

The participants of the focal organisation view their organisation quite similar, although there are some differences in definition and vocabulary. These differences can be due to the fact that members from different disciplines and different companies are combined. Furthermore, the organisation has not stated a common idea of their organisation structure yet. The participants view their organisation as a project based organisation, with no fixed structure or form. One participant described the organisation as follows:

EnerSearch does not exist, you can view it more like a network of people. You can better define it as a project organisation than a company. EnerSearch is only a name in order to apply for money to fulfil the vision within EnerSearch (PM 6)

Another participant defines the organisation as a virtual organisation:

A virtual organisation is an organisation where people are distributed and do not have clear traditional relations to one another as within a traditional organisation (PL 4).

According to the CEO, the organisation EnerSearch is actually a rather traditional organisation with some functional division consisting of a director and a board (see figure 3, the organisation structure as viewed from the CEO). As mentioned before the organisation consists of several groups of people including the higher level of management, and the operating core (Mintzberg 1983). The operating core consists of participants who participate in performing research. The operating core members are placed in several sub-projects that also co-operate with other projects outside the organisation EnerSearch. Some participants work within other research groups, whose research area is closely connected to the research performed within the ISES sub-project. The project members can obtain creative ideas from working in several groups and they can apply the ideas in several research groups.

² SP = Sponsors, PM = Project Members, PL = Project Leaders, B = Board

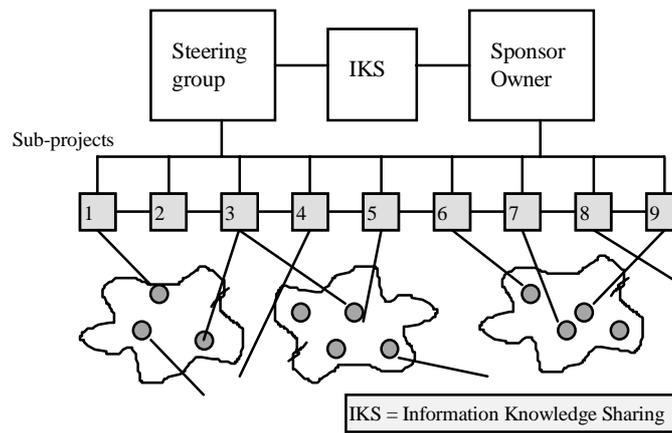


Figure 3: *EnerSearch AB*, source Hans Ottosson, CEO EnerSearch (partners from the sub-project play a role in other virtual projects).

One could compare the view participants have of the organisation with the ideas of Mintzberg (1993) about the organic organisation structure, called the adhocracy. Such an organic organisation is always liable to changes in the environment, since the organisation exists on mutual adjustment of all participants. Therefore, much negotiation and discussion is important in order to state certain policies or principles (Mintzberg 1983). Since the project ISES has only started recently, the participants did not have time to discuss rules or policies yet. Furthermore, Mintzberg (1983) claims that functions and roles are changing so as products and team members. Within the project, one can state that most participants do not know what their role or function is and recently, new team members have been announced. These last aspects, make it rather difficult for the participants to know their place within the project ISES. As mentioned before by Daft & Lengel (1990), the organisation is always confronting uncertain, disorderly events from within and without, yet on the other hand participants would like to see a clear, workable, well defined conceptual scheme. It is difficult to combine these two requirements into one organisation.

Personal and company objectives

Another aspect that became clear from the investigation, is that most participants have two goals to follow: the company's goal and their own target. Within EnerSearch, most participants agree that there is a common vision within the organisation. Everyone agrees on this vision, however, they still claim that almost all members work individually. This individualism is not always conform the common vision they agreed upon. An example of this is that participants within the operating core often work on their own research or assignment in order to gain a degree, money or fame. Therefore, they might prioritise individual goals in order to reach their personal target faster, than doing research/assignments that fit the common vision and target within EnerSearch. As mentioned before this self-interest orientation of each partner, which is often seen with IORs, can lead to actions that are individually rational but that are not suitable for the common objective of the project (Parkhe 1993). This aspect is also viewed within the focal organisation. Individualism expresses from the fact that hardly any competencies and skills are shared between the sub-projects, so that it becomes difficult to design a 'best' solution for the customer. Only resources, investments and financial risks are shared within the organisation, although the aim of most participants with this organisation is that one should share experience and knowledge with each other. Most members in the operating core claim that they do not know the people from the other projects, but also some un-interest can be spotted towards other projects.

According to Davidow & Malone (1992) partners in the virtual organisation should share resources and skills in order to produce a 'best' solution to the market. The combination of skills

gives the strength to the virtual organisation (or IOR). However, in the focal organisation hardly any research is shared at the moment. After the ISES conference (held a couple of months after the formal starting date) when people met each other, new ideas were created about new co-operations within sub-projects, but this co-operation only remains in using each others results into one's own project. After the ISES conference small signs are seen that co-operations between the sub-project are started. There are some projects that work in the same area, but that investigate a different angle. An important aspect to mention is that not all participants in the ISES project agree on the fact that co-operation should occur between projects. This aspect is especially seen in the operating core, while on management level it is clear that co-operation between the sub-projects can only improve desired results. Most members of the operating core are only interested in co-operating with other members that can add something to their own work or research. One participant states the following:

I do not see the connection of ISES and EnerSearch clearly. I hardly co-operate with others and I am not that interested in other participants. I know there are other projects, but I often only think in terms of my own sub-project (PM 2).

Since participants are working distributed, the management has the task to bring project members together, who could co-operate on certain fields (Mintzberg 1983). The difficulty in co-operation might be due to the fact that opinions about how to reach the stated target differ for the participants. From this aspect one can state that a common vision in the organisation is very important, and it should be communicated to all employees in an organisation (Thompson & Strickland 1992). A vision that is stated in words that inspire and challenge can help build committed effort from employees, thus serving as a powerful motivational tool. The vision should be short, clear and often repeated in a challenging and convincing manner. Within EnerSearch and the ISES project this vision is available and stated in most formal documents. However, one can state that most participants just started with the project and have not internalised the vision. The vision has not inspired the participants yet, since the organisation is only in the beginning phase.

View on management

From the interviews and conversations with participants of the ISES project, it became clear that participants have different opinions about the leadership and role of management in the organisation. Most participants in the operating core have only met the CEO of the organisation EnerSearch, but have never met the members of the steering committee nor the financiers of the project ISES. Therefore these participants view the CEO as their manager. Most of them view the CEO as a supporting and guiding leader, instead of a bureaucratic and hierarchical leader. Several other opinions of participants are mentioned below.

- *I do not view Hans as my boss, but as a leader, both hierarchical and supporting, however, not interactive. He is the spider in the web who keeps everything together (PM 3).*
- *I view Hans as the steering group, since I do not know any of the members. Furthermore, he has the overall responsibility, he integrates and organises everything (PM 2).*
- *Hans has sought for money with sponsors who state requirements for these finances. Therefore there needs to be some steering, members should prioritise the ISES goal instead of their own individual goals and in this process Hans has a steering role. Hans has the final say in everything (PM 1).*

The CEO is for these members the person who has the final vote in decisions, but participants have a large amount of freedom in their own sub-projects. This is probably due to the fact that the CEO has made all the contacts with all participants and has stimulated and challenged them to co-operate in the ISES project. Since the project is very fresh, no rules about management are

stated yet, and most members only met the CEO and not the appointed board members. On the other hand, the management level of the project thinks differently about the role of management. They view the board as the managing party of the company and of the project ISES. This last group also mentions a more stricter management than the operating core members and they claim that the board has the final decision making power. The CEO is according to this description a member of the board, and can be seen as the middle man between the operating core of ISES and the management of EnerSearch.

The collective steering group or board is responsible for the leadership and management in ISES (B1/SP2).

The organisation EnerSearch is a functional divided organisation where some hierarchy is available. The management level views the organisation as a hierarchy and they should steer the rest of the organisation, thus also the project ISES. However, operating core members view the ISES project as an individual research project, where members can be rather free in making decisions.

Important is to mention the outcomes of the observations of the conference of the project ISES, where all participants presented and discussed their work. The CEO tried to integrate between the management and the operating core members. Furthermore a discussion was held about what target every sub-project should have in the coming period of time. However, the planned discussion ended in the management enumerating the goals planned and there was little time to discuss this. This did not always fit within the work the project members did. The conference was a very good way for seeing how important it is that people meet each other in order to reach the common goal they stated before. With the conference the sponsors could contribute in describing what kind of research they prefer from the project, and the goals mentioned by the CEO matched the sponsors requirements. Unfortunately, there was little time for the operating core members to discuss these goals of their project and a fast decision was made by the CEO. Within an organic structure negotiations and mutual adjustment are very important, since rules and policies are changing constantly (Mintzberg 1983). Co-ordination in an organic organisation must be effected by those with the knowledge, this means the experts who do the actual work (Mintzberg 1983). Within the case study the management level is the co-ordinating factor in the organisation and no representative of the 'experts' within the project, mentioned above is part of this group. This is a very clear example of the difference between the project ISES and the organisation EnerSearch. The participants should be aware of this difference and should take this into account when making decisions.

Different disciplines

Another aspect that influences unclearness and confusion is the fact that different people from different disciplines are brought together. The participants all have different backgrounds and a different reason for being part of the project. These differences should be taken into account, since combined they can create innovative ideas, but they can also create problems. One important difference is the way people work. This difference is large between the operating core and the management level. The members of the operating core are often used to work in projects with informal relationships. Their projects run over a number of years and articles and theses are the results of the performed research. However, it can take some years before these results are verified and applicable to others. Participants of the management level on the other hand would like to see quick and reliable results and they want to have more control on the work performed within the projects. For example, the sponsors of the ISES project have to be able to justify their investments for annual accounts and for the rest of the organisation of the sponsor. Therefore

they need to show results, so that the investment pays off. One of the sponsors claims the following:

When one compares ISES with a normal industrial project, the ISES project of three years seems rather long. Usually a project must show quick results, because it is still the interest in profits that steers this process. However, being part of EnerSearch projects the sponsor can take part in a research project which they probably had never executed as an industrial research project (SPI).

EnerSearch and ISES

Another aspect important to mention is that several participants have difficulty in stating the difference between the organisation EnerSearch and the project ISES. Since EnerSearch only has one project at the moment, some members have difficulty in viewing ISES as a project within EnerSearch. The organisation EnerSearch forms the frame around the short time projects, like ISES, and the organisation EnerSearch is a rather flat but still functional divided organisation with a board of directors and CEO. Below this there are the different virtual projects like ISES (see figure 3). Some participants emphasise on this difference, and claim that the project ISES could be viewed as a virtual organisation. Within the project, several people from different disciplines and organisations co-operate in order to produce a common goal. Participants of the project are geographically distributed and use resources of the organisation they originally work for, and they use resources from EnerSearch and some of the sponsors of the project. The participants working in the operating core are only hired for a certain period of time within the ISES project and they all have other tasks or assignments besides their work within the ISES project. This complicates dedication in the organisation.

The aforementioned problems occurring in the focal organisation can be summarised into five aspects:

1. First, most members are part of another organisation, where they are physically located and therefore feel stronger connected to this organisation, this could also influence the priorities and objectives of the participants in the organisation.
2. Secondly, ISES and EnerSearch do not have a single location in order to meet each other, this increases the feeling of not being part of an organisation and people view themselves as individuals with an assignment. This aspect decreases involvement in the project.
3. Thirdly, most participants do not know each other yet, since the organisation is still in its starting phase.
4. There is a conflict between two parties, one party wants to have a mechanistic organisation structure and the other wants to have an organic or flexible organisation structure.
5. Participants come from different disciplines and have problems understanding each other and each other's work.

These aspects cause a lot of the above mentioned problems in the organisation and affect the information needs within the organisation. Therefore it is important that these aspects are taken into account in the following sections.

6 Ideal types

With help of the interviews and conversations held in the organisation EnerSearch and specifically in the project ISES certain groups of people can be described that act in the organisation. As stated in the aforementioned section, participants have different opinions about certain aspects within the organisation, especially management issues and differences in disciplines are mentioned. Within section four already the method for summarising data was

presented and ideal types or caricatures are described and explained in that section. The below mentioned ideal types (Eneroth 1984) can be viewed as characteristics of certain actions or people in the focal organisation. The types mentioned exclude each other, and not all participants fit within these three types. However, the aim with defining these ideal types is to strongly emphasise differences between the participants of the focal organisation, so that the reader understands the social situation under investigation.

1. **The client:** The ideal type of the client can almost entirely be viewed as the management level of the focal organisation. Within this management level, most participants view the organisation similar and have a rather distinct vision on their task and role in the organisation. This group has most contact with the external environment of the organisation and has a rather good vision what to do in the future within this environment. They specify their needs to the operating core and support the operating core with equipment and information. Furthermore, because they have such a distinct vision about the future within the utility branch, this group partially steers the organisation into making certain decisions in the research results that are delivered. The clients state the fields of research they view as important for their branch.
2. **The involved:** The involved group consists mostly of operating core members who are motivated to work for the complete organisation instead of only completing an assignment for a financier. These members are interested in the well-being of the complete project ISES, and are keen on receiving news about developments in the EnerSearch organisation. Furthermore, they are involved in future and strategy planning of the organisation and their own personal future, they would like to see a future relationship between themselves and the partners working within the organisation, so that when the organisation disbands, there is still a contact network that can be used in order to receive assignments. Furthermore, the involved are not only interested in their own sub-project, but they are also interested in understanding and learning from other sub-projects. Especially sub-projects that are related to their own project receive special attention and the involved act actively in gaining contact and learning from other project's experiences. An important aspect that can be seen with this group is that the members think that their work or research is their hobby, this means that they are rather motivated is achieving results. Furthermore, they agree on the fact that their research results can only be interesting for the client when the sub-projects combine their ideas and results. Therefore, the involved are keen in co-operating and learning from other participants.
3. **The individualist:** This ideal type mainly consists of members from the operating core of the focal organisation. However, this group is the opposite of the aforementioned involved group. The individualist group is only fulfilling an assignment for a specific period of time. The members are not particularly interested in the well-being of the project ISES nor the organisation EnerSearch. Since they are only interested in their own assignment, they have difficulty in perceiving a relation between the different sub-projects. Therefore, they are not very interested in the progress within other sub-projects and do not think that co-operation with other members could be of help for their own sub-project. This group is only interested in the money they receive from fulfilling the assignment or they are interested in the fame of being part of such a large international project. The members are rather individualistic and do not work to achieve a more efficient organisation, but are more interested in their own individual goals. Furthermore, one can state that these group members only perform when they receive an assignment, they do not operate impulsive on their own.

From the data found in the organisation, it became clear that three different types were available in the organisation. From the summary mentioned in section five this conclusion can be made, since it is rather clear that there are different types of opinion and behaviour within the project. The reason for choosing the ideal types as they are mentioned above, is that they should represent the focal organisation participants in such a way that the terms used are recognisable not only for the participants, but also for outsiders. The ideal types mentioned are not judged upon their characteristics, since all ideal types have valuable aspects that should be applied within the organisation. The clients are rather efficient and arrange matters quickly, furthermore, they form the contact to the environment and to future developments in the market. The involved are keen in co-operating and learning from others, so that they can use this experience in their own work. The individualist is a person who is good at finishing an assignment in due time, since the individualist only concentrates on the matters important for this assignment and this increases effectiveness.

6.1 Information and communication needs of ideal types

With help of the interviews and conversations held in the organisation, the information needs of the different ideal types can be specified in more detail. Special emphasis is put on the information needs of the ideal types. The information needs together with some other characteristics have been the main characteristics that formed the different ideal types. However, since the information needs are taken as a basis for the further thesis, they are placed under a separate section. With help of these information needs specification a more general classification of information can be made. The objective is that this classification can be used in the organisation in order to solve some of the communication and information problems the organisation is facing. The classification can be implemented in an information system so that the information needs important in the focal organisation are supported.

6.1.1 Clients

The clients consist mostly of members of the management level of the organisation EnerSearch, this means that these members hardly perform research within the sub-projects. The clients are interested in finished results from the sub-projects, especially results that they can apply in their line of business and in their organisation. The clients would like to receive periodically reports of the sub-projects in order to check upon the progress of the research going on. This is still seen as a traditional co-ordination type, seen as important in order to steer the research. However, these control mechanisms could lead to some sort of standardisation and this affects the innovative character of an organic organisation (Mintzberg 1983). The clients often need these status reports in order to explain their investments to their own company or boss (the clients are often representatives of a company that sponsors or supports EnerSearch). Furthermore, the clients have a good overview of the market and therefore can steer the research within the project towards a certain field of interest. For this purpose the clients are also interested in the progress of the research. However, the clients do not have that much time and the information they want should be short and efficient and suitable to their function. The clients are especially interested in the progress of other clients, they are interested in each other's products and markets and future ideas. Therefore, the client is interested in becoming informed about new partners in the EnerSearch organisation and also costs and benefits are interesting for them in order to justify their investments in the organisation.

The clients often work in rather traditional organisation structures and this influences their behaviour concerning information distribution and information handling. Several aspects have already been mentioned, but another aspect is that the client wants to receive information formed to their requirements. The client does not search for information by themselves, but wants to

receive it when required. Since the clients have a rather powerful position in the organisation, they often finance the projects within EnerSearch and state requirements for research results, the clients can also steer the organisation.

The involved and individualist groups view the organisation as an organic and flexible organisation, but the clients would rather like to see more traditional organisation aspects, e.g. control, and periodically reports. Because of the powerful role of the clients, it might be that the organisation grows towards a more hierarchical organisation type. When an organisation is flexible and dynamic (as the operating core views it), levels of command, control and power of information, common in hierarchical organisations, become delegated, decentralised and diffused (Parker 1996). Trust building becomes mandatory and information that used to be withheld at each successive level in the hierarchy now becomes shared, or at least accessible through informational networking (called information empowerment). It is very important that when the organisation structure changes into a more flexible structure, management's role changes towards a more supportive and integrative role. However, it is rather difficult for most leaders to change to such an organisation style if they have worked in a hierarchical one before, the command and control manager will not be comfortable with information empowerment and its collegial relationships. Since most of the clients come from hierarchical organisations and they basically steer the ISES project, it could occur within the project that management and subsequently the client have difficulty in adjusting their behaviour to changing circumstances in the environment and the organisation structure. Already small signs can be seen that slowly the organisation turns towards a more hierarchical one than a flexible one. Examples are the way how clients view the organisation as a hierarchical one with an amount of control through periodically reports. Participants are interested in the decisions that are made about the strategy to steer the organisation. This aspect is at the moment overlooked and should be taken into account in the future. All participants should have a similar idea of how the future of the project and the organisation EnerSearch should be. However, at the moment two different groups exist in which a conflict between a bureaucratic and organic organisation structure occurs. Since the clients are powerful, it seems logical that their wishes are fulfilled, while the operating core members do not agree. This could evolve into severe conflicts between the operating core and the clients and would not increase co-operation and synergy. Furthermore, the work sphere on the project would be affected when this conflict is not dealt with.

When discussing informal communication, the clients are especially interested in other clients, not in the operating core. They only discuss matters with members from the operating core, when the client considers it interesting for their organisation and when results have been made. However, contact between the clients and the other participants should increase, because it is important that other members of the organisation know the requirements of the clients and developments viewed by the clients. The operating core is working according to the wishes of the client, and therefore it is important that both parties communicate, so that results arise that are suitable and applicable for both parties.

Since the clients participating in the ISES project could be viewed as competitors, they are interested in each other's products, markets and solutions. They are eager to learn from their partners, but unclear is if they want to discuss their own business policy. This is often seen as a problem within strategic alliances. Organisations want to co-operate, but are not willing to give the partners their solutions and ideas, since they are afraid that it will be used against them. Unfortunately, this does not increase co-operation and a synergetic effect of combining skills is not reached. This aspect can also be seen with the clients of the focal organisation, the clients are afraid to tell too much about their new developments, although their developments are in the

same field as the research in the project. The clients are willing to present a part of their own work, but never the whole.

6.1.2 Involved

The involved would like to receive detailed information about the organisation EnerSearch and about the project ISES. They are not only interested in finished articles, theses and research results, but they would also like to receive status reports about the process of research in the sub-projects. This group is interested in other sub-projects and would like to participate in discussions and brainstorming sessions with their knowledge, in order to jointly create new ideas. The group is also concerned with the overall organisation EnerSearch and would like to know the long term strategy, developments for new projects, new sponsors and other interesting material. At the moment hardly any policies or routines about how to distribute information are made and the involved group is frustrated about this aspect and would like to change this. The involved are interested in receiving status reports, but are not very keen in writing them. This costs them precious time that could be spend on the research for the sub-project. Furthermore, the status report definition of the involved is different than the one of the client. The involved often writes an article or a thick paper about their progress, while the client only wants to receive a small summary of one to three pages. The involved view it as important that not only results are mentioned, but also how they came to these results, the methodology and theoretical background should be mentioned.

The involved are often familiar with working in a flexible and organic organisation structure compared to the clients who work in a traditional organisation. Due to this, their information needs differ slightly from the needs of the clients. The involved view information distribution as rather personal and they claim that every one is responsible for gathering their own information. In the organic organisation one often has to search for information needed for one's activities, therefore this is a rather logical activity for the involved. Information differs per person or group whether data is conveyed to information, this means that some people consider certain aspects as something unknown, thus information (Denning 1995³), others view this as known facts and therefore unimportant thus data. From this point of view it is rather difficult to state for every one in the organisation when information increases their knowledge and if one should be able to question if the information received is true (Flückiger 1995). From this discussion one could state that the persons who send information should adjust the information to the receiver so that the information is found and read. However, this requires that all members know each other rather well in order to send them tailor made information. One example of a participant is stated below:

One has to turn around the notion information, now one only has a top-down information flow in which the top decides what others should read. However, one should place all information to the disposal of all participants, so that they have to search actively for their information. Everyone has its own responsibility to search information and this means a change from being or having an information distributor to becoming an information consumer (PM 1).

Besides actively searching for information, the involved consider it beneficial to have brainstorm sessions between sub-projects that could co-operate and to have discussions with other participants. These sessions and discussions not only improve research ideas and results, but benefit to social contacts between the participants. When people meet in person not only specific research subjects can be explained in more detail, also informal, non-verbal communication and facial expressions can increase co-operation between the sub-projects. From interviews it became

³ Information theory is discussed in the appendix.

clear that participants had difficulty in working together with others whom they did not know in person. A participant makes the following statement:

I think that the vision within EnerSearch should be defined clearer, because that is very important for such a project based organisation. Everyone should know towards what goal we are working and at the moment this is not the case. That is the reason why we have a communication problem at the moment; We do not know each other. When the target has not been set, is it difficult to see the connection between the different projects, and especially this connection gives you the kick to work further (PM 6).

After the aforementioned conference, partners were eager to get to know each other and most contacts and new ideas for possible co-operation developed during informal parts of the conference, e.g. during lunch, diner and in the hallways. Interesting was to see that people really had to sit down, so that they had the possibility to have a two-way contact. This last aspect is described by Daft & Lengel (1990) and Hinds & Kiesler (1995) where information richness is dependent on the bandwidth and synchrony. Bandwidth is seen as the ability to exchange information from all human senses: sight, smell, hearing. Synchrony refers to whether people can communicate at the same time, e.g. telephone is synchronous, since people can talk to each other at the same time. The bandwidth and the synchrony aspect are very important when people have never met and do not know each other, because at that point one needs to communicate with a rich medium in order to come closer to each other. Especially, in order to co-operate one should not only know each other, but one should also trust each other according to Handy (1995). Trust is a very important aspect in the IOR, since the whole organisation is built on trust. Without trust one could not work together on so many different places and it would be difficult to give much responsibility and decision-making power to participants. Therefore the ISES conference was very important. Important, is that more gatherings are arranged so that participants can discuss matters in person.

6.1.3 Individualists

The individualist is interested in finished results of the research and in general aspects about the organisation EnerSearch. However, no detailed reports are required and no status reports about the process of the research is needed as the involved wish. The results should be stated in summaries, easy to read for everybody, so that this group does not have to spend too much time on reading the material. When providing information, this group is not particularly interested in writing status reports periodically. This often takes too much time, which does not pay off. Although status reports should only present a summary, the individualist still wants to have the possibility to search for detailed information when this is of interest for its assignment. Therefore, individualists consider it important that information is available within a database that should be applicable by all participants. When individualists need more information about other sub-projects in order to support their own research, they are interested in receiving much and detailed information. However, they would rather be in control of the information supply they receive. Most individualists combine active searching for information when they work on an assignment with passive received information. The information received passively is in this case often information about other sub-projects and about the organisation EnerSearch. Active searching is often done within the field of their assignment within the ISES project.

The individualists come from hierarchical and often from organic organisation structures and therefore their information distribution techniques differs per person. Some individualists only work periodically for companies, since they perform consultant assignments. The individualists feel not really part of the organisation. However, this changed a little bit after the conference held for the ISES project. Most individualists have another job besides the work they perform in the ISES project and therefore do not want to spend too much time on familiarising with participants

and communicating informally with other participants. Some individualists try to build their own business network with participants (especially clients) within the ISES project. This network could be used in future for other assignments and tasks.

6.1.4 The common operating core (individualists & involved)

Certain aspects important to mention are similar between members from the operating core and therefore they are discussed together. Most participants use e-mail to sent information or to ask questions to someone, however, e-mail is only used for short messages. Some participants state that it is easier to contact people by using this means, because less formality is used and shy people can ask (almost anonymously) questions which they never dared to ask in person. The way participants use internet, e-mail or memo differs, due to the fact that not all members have access to these applications. Some participants sent almost all their information via e-mail, but all members agree on the fact that personal and urgent messages, that need a little consideration, are better made via phone or face-to-face contact. Daft & Lengel (1990) only discuss face-to-face rich media for processing information in an organic organisation structure. Recently other types of media have gained popularity and people are getting used to work with these types. Although Daft & Lengel (1990) wrote their article in 1990, the wide-spread use and increased popularity of e-mail have not changed e-mail towards a more richer information processing medium. Still face-to-face media is seen, by the participants, as the most important medium in order to get to know each other and to discuss delicate and or difficult and social matters. One important aspect that should not be overlooked, is the lack of social redundancy in electronic information and communication means. Here redundancy⁴ is used as the important forms, norms and rules in order to communicate with each other in society (Åstrand 1992). These social aspects, known by almost everyone with the same background, simplify communication and understanding of messages between people. Especially, within the networking organisation it is important that people use certain aspects, like language, politeness and other social behaviour in order to communicate with each other, since the organisation does hardly have an informal and personal communication stream. One notices that with e-mail and other electronic means for communication and information less formality and politeness is used than before, also messages are stated shortly and straight to the point. This could implicate that certain messages are misunderstood or mis-interpreted, since the recipient does not have the same context and language as the sender (Åstrand 1992, Flückiger 1995). As mentioned before, not all information can be sent via e-mail, since certain things need a lot of explanation and consideration. However, more and more information is sent via this electronic communication means, also matters that were not sent before. Empirical research (Power 1992) shows that messages send by electronic mail tend not to reflect features of the social context such as differences in status between author and recipient. Messages omit information about the sender's location, department, status, age and sex. In this investigation, people preferred to use mail to send messages to superiors, not to subordinates (Power 1992). Furthermore an investigation by Sproull & Kiesler (1991) indicates that when communication lacks the dynamic personal information of face-to-face or telephone communication, people focus their attention more on the words in the message than on each other. Communicators feel a great sense of anonymity and feel less empathy, less guilt, less concern over how they compare with others and are less influenced by social conventions (Sproull & Kiesler 1991). No evidence is made that these things happened in ISES. However, the organisation should be aware of the fact that only communicating via e-mail can have considerable effects on people and on the way they co-operate.

⁴ For further explanation see appendix.

Another aspect within ISES is, that it is decided that all general information about the organisation and about sub-projects is placed on the homepage of EnerSearch. Furthermore, participants should self update information about their sub-project. However, not all members have access to internet facilities and some do not know how to put information on a homepage. Therefore it is important that EnerSearch supports these members, so that they are able to read, and put their information on the homepage. It is important that all participants have access to this information, so that they all feel part of the organisation and are not left out.

As mentioned before, participants in the project differ in personality, education and other cultural aspects. Therefore the way they perceive something as information differs per member. For most participants it is very difficult to state what sort of information they need and what the organisation needs. Some participants, mostly involved and individualists only think about information as an increase in knowledge, they learn something what they did not knew before. Flückiger (1995⁵) discusses several researches who have mentioned this item, like MacKey and Dretske. Furthermore, Denning (1995) claims that most researchers define information as statements or signals that alter possibilities, increase knowledge, answer questions and reduce uncertainties. On the other hand the clients view information both as an increase in knowledge and as a control mechanism in order to check the research process in the projects. On the one hand information for them is an increase of knowledge about the process of the research and about certain gained results. However, on the other hand it is also some sort of check-up on the proceedings of the sub-projects. This control mechanism is not only meant for the clients, but also to encourage or to urge the executors of the projects. Every time a report has to be written, the executors are forced to think about their research and the progress they make with it. This is both positive and negative. Positive in a sense that they are forced to proceed with their research and negative in the way that they are forced to present results. Presenting results periodically can decrease the creative and innovative process of research, e.g. one has no time enough to investigate all alternatives thoroughly.

6.1.5 Conclusion

From the above mentioned ideal types it becomes clear that there exists a conflict between the operating core (individualists and involved) and the clients (the top). This conflict can also be explained as a conflict between a bureaucratic and an organic organisation structure. Furthermore, two groups within the operating core can be spotted, who are the opposite of each other. On the one hand the involved group is eager to co-operate and learn from other sub-projects and members, while the individualists are not interested in co-operating and only want to fulfil their assignment individually. This can also be seen as a conflict in the operating core. Important is to understand what the goals of the ISES project are, is this to co-operate and to create synergetic research results, or is this to develop research results individually as soon as possible. From the clients point of view co-operation and sharing of resources and skills is what makes their project so interesting and therefore they would like to see more co-operation and collaboration. The aforementioned problems are not only due to lack in communication and information means, but are also due to personal objectives and future plans. These personal aspects mean a great deal within the project and should be cleared out. Furthermore, it is important that participants have a similar vision within their work, and this is not the case within the operating core. After a similar vision has been internalised (it is already formalised on paper, but not internalised with the participants), the realisation can be planned and implemented. Since internalising the vision is a leadership problem, this is not dealt with further in the thesis. However, the problems occurring with information distribution and the different needs to

⁵ For more information see appendix.

communicate and to transfer information are taken into account. In order to come towards solutions to these communication and information distribution problems, the information used within the organisation is classified into several aspects. Two alternatives are used in order to find a means to classify information in such a way that the requirements of the participants are fulfilled. This classification can later on be used into an information system that can support communication, information distribution and eventually co-ordination between the distributed members within ISES.

7 Classification

Some authors, e.g. Flückiger (1995⁶), state that communication is always placed in a certain context, this context could also be seen as the environment and paradigm in which we live and the culture we have. Therefore context is an aspect that is placed with a model that is developed in order to classify information. Important is to mention that communication and information sent have certain background aspects that should be taken into account (Wiio 1973).

- 1 Individual aspects, e.g. male or female, age, opinions, physical and mental health;
- 2 Social aspects like other people, norms and values, status, background, nationality and culture;
- 3 Disturbances in the communication and information stream, often seen as technical disturbances. However, also other disturbances can be seen, for example: the message can be filtered from the sender or the receiver's side. This means that the sender/receiver do not want to receive the message, do not understand it, use different vocabulary or languages, read the message selective;
- 4 The possibility to have feedback in order to see if transmit was successful. Feedback is often viewed as a technique in order to see if the message has arrived or not. However, feedback can also be viewed as a personal answer from the receiver of the message. Here a connection is made to the information richness theory of Daft & Lengel (1990), where they claim that interactive communication gives the highest richness. With direct feedback (telephone or in person) people can interact directly and can explain their message when something is unclear;
- 5 The media that is used when sending a message. Important is the media through which the information is send, this has already been dealt with when discussing the information richness theory of Daft & Lengel (1990). Within this theory statements are made that within an organisation where novelty and synergy is the objective, people benefit from rich media. Rich media means, media with high feedback capacity, where the ability to exchange information from all human senses is high (sight and hearing) and where people can communicate at the same time (synchronous) (Hinds & Kiesler 1995).

These five aspects (Wiio 1973) are taken into account when classifying information. In order to exemplify the aspects a model is created, which is showed in figure 4. The aspects mentioned in the model are discussed in more detail, specified to the focal organisation and the investigated communication and information distribution problems.

⁶ See appendix for more information.

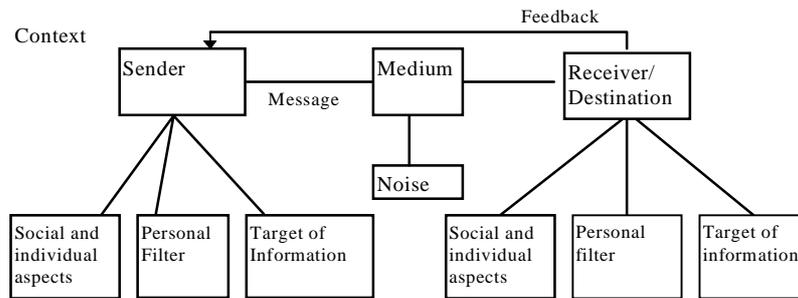


Figure 4: *Model to specify communication and information.*

The model of figure 4, is constructed in the following way. A sender sends a message via a medium to a recipient or certain destination (this destination can be a database for storing documents). The receiver or the destination can give a reply (automatically or personal), so that the sender receives feedback on the message sent (feedback does not always have to be given, since not all messages need feedback). The sender and the receiver (when human beings) have several aspects that should be taken into account. Some of the aspects are mentioned by Wiio (1973), e.g. social and individual aspects and disturbance (personal filter). However, also the target of information is seen as important, since the participants in the organisation have different opinions about what information should be prioritised and what not. The medium that transmits the message can have problems with technical disturbances and this can cause that the message is not delivered or is delivered wrong. Furthermore, communication is always placed in a certain context, this context could also be seen as the environment and paradigm in which we live and the culture we have. Therefore, the context is placed in the model in order to show its importance.

Social and individual aspects

First there are social and individual aspects, like sex, culture, nationality, background (e.g. education) and specific norms and values that influence communication. These aspects form a person's view of the world, a paradigm one lives with. In order to send a message to another person, it is important that the sender uses concepts that are understandable for the recipient. Especially, the language of the message is influenced by the paradigm of the sender. For example, Indians use not only words to communicate with each other, but also a lot of signs and signals, these signs and signals and even the language are impossible to understand for other cultures. Every culture has its own rituals, traditions and its own language or vocabulary. Therefore in order to communicate with each other one should at least understand the paradigm or concepts of the recipient or destination. Within ISES, most members have a different background in education and work, this is very important to mention, since these differences influence their behaviour, language and way of thinking. The majority of the participants have a technical background and do research in that area within the ISES project. On the other hand there are some business administrators available who do projects within the area of organisational change, marketing and strategy planning. From the conversations and interviews it became clear that these two groups had difficulty understanding each other.

This difference in values and morals can also be viewed when discussing clients, involved and individuals. These three groups have their own objectives, ways of communicating with each other and they might use different concepts in order to communicate. The three ideal types show that the participants come from different organisations, e.g. the clients often come from rigid hierarchical organisations, while involved and individualist often worked within flexible projects. This means that for these groups different aspects are important, e.g. for a person from a

hierarchical organisation control and check-ups are often important, while for a member of a flexible organisation this is seen as a burden, somewhat like a "big brother who is watching you" feeling. This implies that the sender should carefully consider to whom one sends a message. Important is what language to use, what concepts and how much information should be send (e.g. clients would like to receive short statements where results are presented, no other information is considered important). Furthermore, distribution of information should form a compromise between the rigid control tool of the hierarchical organisation and the information distribution with less routines in the flexible organisation. This is important, since at the moment there is a conflict in the organisation between the bureaucratic and organic organisation structure. It is important that this conflict is solved, so that participants know the rules within the organisation and know their role in the project.

The paradigm people use influences an internal coding process used by the sender to translate thoughts, feelings and ideas into words understandable for the recipient. It is important that one understands that this internal coding process has to take place before a message can be formed into words and or signals, and is sent (Wiio 197). This coding process forms the language in which the message is formed. This language forming process is decisive in that the recipient is able to understand the message. How this message is put to words is dependent on one's education, background and culture. For example, one often sees that people who have a mathematical education, try to put certain messages in a rather rational and mathematical-like vocabulary. Often no extra social aspects are mentioned around the message, but only the core is important and should be argued well. Within the ISES project also differences in people can be seen, as mentioned above. However, all parties should try to find a way to communicate with each other, so that it does not matter what paradigm they have. Besides an internal coding principle, also external coding is important. This principle often implies a technical process in order to sent a message to a destination by using technology, e.g. a message has to be put in computer code in order to sent it to a destination via a computer system. These technical features are often taken care of by computer systems, data- and telecommunication systems (Fulk & DeSanctis 1995) and the sender does not have to be able to use the external coding. However, the sender should be aware of how the process of coding and sending functions, in order to work with the applications. These external coding processes are important to mention since the strategic alliance and networking organisation with distributed members is rather dependent on communicating via information technology. From the interviews, it became clear that not all participants had access to internet or e-mail, this makes it rather difficult to contact each other via the computer, since most information is sent via e-mail to the participants. Another aspect that is important is that not all participants know how these systems function and what potential these systems have. Furthermore, at the first meeting of the ISES project, a couple of months after the starting date, it was decided that all important information about the sub-projects should be placed on internet on homepages of the participant and of EnerSearch. However, some participants have never made a homepage and have difficulty putting their results on a homepage. Therefore, in order to make this external coding principle work, people should first be able to understand and be able to find out how things work. Another aspect that is important, is that all information put on the computer, so that everyone can read it, is written or placed in such a language that every participant is able to understand this. Therefore participants should also look at their internal coding process in order to see if their messages are understandable for the recipient. The sender should always keep in mind to whom the message is sent, what group or individual will read the message.

Personal filter

Within the model noise is mentioned. With noise is meant technical disturbance with the transmittance of the message. However, there is social disturbance which could cause a failure in understanding the send message. This personal filter is not the same as the internal coding principle, but it is more a conscious filtering of the message by the sender. However, it is difficult to spot, since it is close connected to the paradigm and culture one has. The filter that can be applied by the sender, is often a subjective one. Often the usage of a filter is done informally and the sender is not even aware of the fact that the sender has filtered the message. For example, one can talk about one's work without thinking about the fact, that the recipient does not know anything about one's work or specialisation. Since the message is so obvious for you, you leave out a lot of aspects, but the recipient is not able to understand the message without these aspects. However, this subjectivity is not always the case. With, for example, e-mail a filter is used in order to only write down the raw message (only text) and nothing more. ISES participants agreed on the fact that with e-mail often formalities and other cultural aspects are neglected, since it is used all over the world and one does not even have to know one another in order to contact each other. The leaving out of cultural and formality aspects is seen as some sort of filter, so that only the point of discussion is mentioned. Within EnerSearch one can see that e-mail has simplified making contacts, since people are less afraid to contact each other. Some members mentioned that they especially liked the medium, because it would not reveal their shyness. According to Hinds & Kiesler (1995) and Sproull & Kiesler (1991) e-mail lacks the social aspects that are often important to interpret the message correct. These social aspects are e.g. facial expression, tone of voice and other non-verbal communication. Therefore it is important to take into account who the recipient of the message is and what the message contains. If the message is a complex problem, it might be better to extend one's description of the problem.

The recipient can have several filters when receiving the message, these filters are subjective and are e.g. interest in the message, spotting the message, understanding it, perceiving it in the way the sender wants it to be perceived. These aspects are all important for a successful transmission of a message between a sender and recipient.

Target of information

Important for the sender and the recipient is for what purpose the information is sent. Several purposes can be stated, e.g. control mechanism, status reports, presenting ideas, giving general information. Not all information has a high priority for some recipients and therefore it might be wise to state what kind of information is send, so that the recipient can choose if this information is of immediate importance. When applying the three ideal types a clear difference can be seen between the groups. The clients might prioritise reliable and tested research results which they can apply, but prioritise status reports or general information about the project less high. The involved on the other hand are more interested in ideas instead of in status reports. The involved would like to participate in other sub-projects and stimulate research results that could be favourable for their research. The individualists are not very interested in other sub-projects and would rather have short messages in which general information is stated that is useful for their work in the project.

7.1 Content and destination based information

The model stated above for communication and information processing is created in order to classify certain types of information. These types of information can be applied in the organisation with help of an information system that is adjusted to these aspects. In the following section, one alternative classification is presented in which information is divided into information

based on *content* and information based on *destination*. Below these two divisions are explained in more detail.

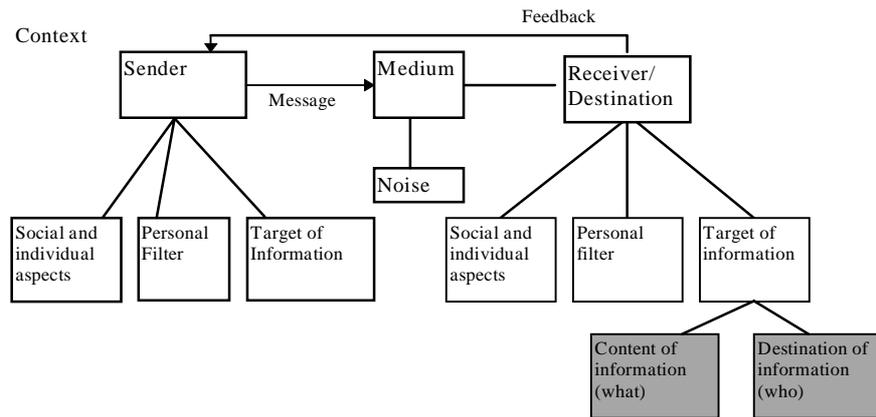


Figure 5: *Communication and information handling model*

Destination based information

A lot of literature is written about information that is specified to a certain destination. This literature is often found in data- and telecommunication literature (Baas et al. 1988). Especially within datacommunication it is important that a destination is stated, so that the system is able to sent the message to the right person(s). However, with current technology, not all information has to be sent to people, but also information can be put or remain in a database and people who need this information can actively search for it themselves. According to Galegher et al. (1990), especially in a research and development environment, it is important for people to meet each other and have informal contact by physical proximity in order to be an effective research and development department, where novel ideas can be investigated. However, in the focal organisation members are geographically distributed and therefore explicit support of the information supply is important for co-operation. Especially, in an organisation like the focal organisation it is not only important to state to whom the message is destined, but it is also important to state the content of the message. The content is important, so that members can transmit specific information to each other. Furthermore, not always a recipient is defined and information is placed into a general used database or on internet. Members can search actively for this special content information, important for their research. The below mentioned types of information are derived from conversations, interviews and parts are taken from literature (Parker 1996, Davidow & Malone 1992, Åstrand 1992). Before one can sent information one should already know for what target the information is used and who receives the information. Therefore a distinction should be made between information to *destination* and *content* information. Information based on destination is information to a specific person or group of people. Content information entails details about products, e.g. quantities. The information based on destination can be divided into several groups:

1. *Personal or individual* information: Individual information is information to only one person (this is often more personal information, since only one individual is addressed).
2. *Group/global* information: information to the whole organisation, including all participants. This information is e.g. organisational aspects, the budget, new members, meetings with the whole group.
3. *External* information streams: information streams outside the company, e.g. to competitors or interesting parties.
4. *Database*: a database where all information is stored, this database is not taken into account in the rest of the model.

Content information

Content information is information about products (e.g. quantities), this information is not meant for a specific group of persons, but could be used by everyone who is interested in this type of information. Especially, in an organisation where its members are geographically distributed, it is important that people are able to obtain detailed information required for their research project. Therefore this content information is not placed under destination based information, but has its own categories. Content information is important, because the sender should know what sort of information is sent and for what reason. Content information does not always have to be sent to participants, but it can also be available, e.g. in a large database, so that everyone can obtain this information when needed. With content information a couple of important information types are presented by the researcher, which are based on the researcher's own observations and on literature (Parker 1996: 194).

1. *Product/service* information: This is information about the products made in the organisation, within EnerSearch, this is the research going on. This product information does not have to be directed to any one in particular, but can also be stored in a database within the organisation. However, it can be sent to one group, or to individuals on request. The product information is important for all participants in order to co-operate with each other, since they need updated information about what research has been done and what the results are within certain groups and prevents from research done double. This information can be used into the research or work of other participants. The product information is rather detailed information about the product or service in an organisation, because it should be used for other parts that need to know all technical details about the product in order to work further with it. Furthermore, it is important to maintain manuals and other detailed information about the product or research for successor research projects.
2. *Process* information: This is information about the process of the work, the goals and how far one already has come. However, also information about cross functional teams could be mentioned here, work flow reports, and co-operations between several projects or teams. Within the ISES project, not much co-operation can be seen at the moment. However, after the ISES conference certain partners discussed possibilities of combining their research domains.
3. *Financial* information: Financial information about the project or organisation is always important and interesting for all participants of a virtual organisation, since here they can see if the project still has a future financially or not.
4. *Logistic* and *other* information: This type of information entails often numerical and quantifiable aspects, that are presented as e.g. logistic information, production figures, sales figures, graphs and other figures about how the company is operating are presented.
5. *Social information*: Business culture and other informal information streams are important to mention. This is not an information type that can be placed under destination based information. However, it is difficult to place it under content information, since its content is difficult to spot. This information type is a very important one within the virtual organisation, and should therefore be placed into the classification of information. The reason for placing the social information with the content information types is that the information supports more personal and social contact between the members. This information is not always sent to a specific recipient, but can be actively searched by participants. As discussed above, not all participants are in need of personal contact with other members. Therefore, one should not force them into such contact. However, members that do need this contact, should be able to obtain the possibility to meet and have informal communication with other members.

The aforementioned distinction between information based on destination and on content is made in order to classify the information needed in the focal organisation. In view of this classification a design can be developed for an information system that could support these information types in the organisation. Since all members of the focal organisation are distributed, and members do not meet each other, information and communication should occur with other means e.g. a specific information system for the IOR. In order to understand the relation between the two information types, a matrix is presented where content information types are placed horizontally and destination based information types vertically. Examples of the combination of content and destination information types are stated in the matrix.

The below mentioned matrix is made with help of available literature, interviews and conversations with participants of ISES and researchers in this area. With most parts of the matrix some examples are mentioned in order to describe what the types of information entail. When applying this matrix to the ISES project, not all types of information are applicable in the organisation. An aspect that is important is the social type of information. As mentioned before this type does not really fit into the matrix, since it does not have content nor destination. However, this type is still very important in the focal organisation, since people have to co-operate in order to produce a product. For this co-operation one should contact each other regularly and one should be able to trust one another. According to Handy (1995), in order to build this trust, people have to get to know each other. The social information is important in order to work effectively, people can work towards a common target instead of towards an individual target and they can support and stimulate each other's work. Therefore the social information is mentioned in the matrix and some examples are stated that could support social aspects like culture forming and informal contact between members. Furthermore, the combination of external information and business culture, is a complicated combination. The most important aspect here is that the virtual organisation can show its effectiveness outwards to e.g. competitors and other interesting parties. With a good common culture and vision, the effectiveness and innovativeness could be influenced in a positive way. Within ISES, the last information type is the most important one, since participants feel that social information is lacking in their project. The social aspects are important in order to get to know each other, to learn to trust each other and to understand each other personally and in the work they perform. Therefore, this information type should be supported explicitly within the organisation. Important to mention is that not only management has the task to explicitly support the social information type in the organisation, but also participants have an obligation to work on the distribution of this kind of information. The role of the participants changes from a passive one to an active one. The participant judges how much information they need, what sort of information and how much informal contact they want with other participants. The social character can not be forced and some people need more contact than others. Therefore people should be active in finding the information they require. Furthermore, the organisation should support information distribution, so that people are able to find information they are looking for. In order to have all information available on request or demand, an information system could be the answer in which all information types are implemented. A presentation of such an information system is discussed in section 8.3.

Content/ Destination	Product information	Process information	Financial information	Other/logistic information	Social information
Individual information	Specific research methodologies, results, data, formulas for one sub-project	Development process of a part of the project. Goals of a sub-project.	Individual budget of research, costs, profit of one's research project	e.g. Figures about an individual's project. e.g. logistics, graphs	Informal personal contact, e.g. diner, doing sports
Global information	Research results, tested results and applications of the results	Co-operation and integration between sub-projects	budget of the complete organisation, total costs for ISES.	Numeric information about the environment, competitors	Team building within ISES., e.g. trips to a conference or an annual meeting
External information	Tested research results of a sub-project, published in an article/ conference	General/detailed information about developments in the projects and co-operations between teams	Annual account of EnerSearch to all interested parties and tax authorities	The aforementioned aspects, but meant for interested parties. e.g. new sponsors /competitors	Information showing the environment the group forming, efficiency and co-operation possibilities

Table 1: *Matrix of classification of information types based on destination and content.*

7.2 Ideal types and information distribution

The ideal types mentioned before in the thesis, have different information needs and communication needs. These needs can also be classified as a second alternative classification that can be applied in order to support communication and co-ordination in the focal organisation. This information can be used within an information system that is specified to the needs of the three ideal types that are mentioned below.

7.2.1 The client

The clients have besides their work in ISES, a full-time position with their mother company, the company they actually work for. Therefore, work from this company is prioritised over ISES project work. This means that clients are not interested in receiving detailed information about the processes of the research going on and they are neither interested in detailed discussions about what research methodology is used and what theory discussion is applied. Therefore, the clients would like to receive information which is short and briefly and that can be applied efficiently by the clients. This means that status reports about the developments of the research should be no longer than three pages on which results and targets are mentioned. Furthermore, it is important that research data also emphasises the application of the research results so that the clients can justify this investment to their management. The client might be interested in more detailed information about specific research projects. However, only when the client considers to apply this research, more detailed information is required. Furthermore, the clients are interested in logistic and financial information in order to justify their investments and to control the finances and proceedings in the ISES project. Information about new sponsors is also important, clients are interested in the reason for their participation and their role within the project. Results of the complete ISES project, especially a summary of how the results could be combined to one product is also suitable for the clients when they want to steer the organisation in its strategically decisions. The clients do not have time to get to know the project members, especially the operating core. Therefore, informal contact can hardly be seen from this group. It might be that clients amongst themselves have contact in order to form a network for the future, however, this does often not include the operating core members.

7.2.2 The involved

The involved members work for a large amount of time for the ISES project and are therefore more motivated to receive information about proceedings and developments in the sub-projects (although most members are still working with another organisation). Furthermore, involved members are interested in co-operating with other sub-projects in order to produce better results. Therefore, they are often interested in detailed information about the methodology, theory generation and literature discussion of the different projects. The developments in the project are important and they are interested in helping and supporting sub-projects in finding solutions that are on the border line of their own sub-project. The involved are also interested in results, as the clients are. However, not only the results are important, it is interesting how one has found these results and how they can be applied in other research. What effect do these results have on other sub-projects and on the complete project and target of ISES is interesting for the involved. Involved are also interested in general information about the whole ISES project and information about the long term strategy. The involved would like to participate in forming the strategy, so that they can influence the future of the project and subsequently also their own future. Furthermore, new developments in the project within research, new partners or new sub-projects are important to these member. However, also information about the organisation EnerSearch is interesting, since developments in this organisation might influence work within the ISES project. For co-operation, informal contact is rather important and this can be seen with the involved members. They are interested in co-operating and are willing to arrange special (informal) meetings between members.

7.2.3 The individualist

The individualist is often hired by several companies in doing assignments, one could often view this person as a consultant. Since the individualist has to divide its time over several different assignments, the individualist does not have too much time to participate in ISES outside its assignment. Therefore, often the individualist is interested in receiving short information where summaries and conclusions are mentioned. However, important is that all information is available to them when they are interested in it or when they need it in order to fulfil an assignment. Especially when an assignment crosses another sub-project and already material is available, the individualist would like to receive detailed information about the results and the complete research methods. The individualist is eager to fulfil its assignment to the best he/she can within the time standing for it. Furthermore, the individualist is interested in receiving general information that concerns their work, e.g. strategy, financial information and research results. This information is interesting for the individualist's future. The individualist does not have much time to spend on making informal contacts and therefore, they are often not very interested in this. However, the individualist is always working on its future network of people in order to receive future assignments. Therefore, members that could be important for future co-operation are interesting for informal contact. The individualists are present on most general meetings, however, not all informal meetings do they consider important. The general meetings are important in order to build a network of people and in order to hear about the complete project ISES.

Below the above mentioned ideal types are placed in a table (Table 2) with the modes of information discussed before.

Info type/ Ideal type	Product information	Process information	Financial information	Logistic & other info	Social information
Client	short + briefly presented results + applicability of results	Hardly interested in interaction between projects	Interesting, justifying their investments	Interesting, justifying their investments	Not interesting. Only might be interesting between clients
Involved	extensive information, methodology and theory discussion. Results also important	Interesting in interaction and co-operation between sub-projects + developments in the organisation	Only interesting when it concerns the participant. E.g. Statement of account	Not highest priority. Might be interesting for their sub-project and the ISES project in general	Very interesting, since members want to co-operate and get to know each other. Team-building
Individualist	Short presented results of projects. However, detailed material should be available for those interested.	Hardly interested in co-operation and interaction. Only matters that concern their assignment are of importance.	Only interesting, when it concerns their assignment and financial position.	Only interesting, when it concerns their assignment and financial position.	Only interesting, when they view this relation as a future network relationship that can be used to receive future assignments

Table 2: *Matrix of information and communication needs specified to ideal types: client, involved and individualist.*

8 Information and communication technology means

In order to answer the question how one could support co-operation and communication in the focal organisation with help of information technology, it might be wise to state several information technology means that could be of use when supporting the aforementioned classifications. The means that are presented below are often used for both flexible organisations with no single geographical location and for hierarchical organisations. However, as discussed in the theoretical framework section, it is not easy to just pick a single medium out of this list for an organisation (see information richness theory of Daft & Lengel 1990). The medium used is very dependent on what sort of information is intended and to whom the information is sent. Therefore the aforementioned matrix of content and destination information types and the matrix of ideal types information needs is used in order to discuss the medium that fits best. The information richness theory described by Daft & Lengel (1990) and Hinds & Kiesler (1995) is used as a basis for appointing what kind of medium could be used for the different information types. First the information richness theory and its application on the aforementioned classification is discussed. In the second part of this chapter, the available information technology means that could be used as media for communication are mentioned in more detail.

8.1 Information richness

The theory of information richness presented in the theoretical frame of reference of section three and with the results of the investigation, the media for the case study and the information types can be discussed. First, alternative one, mentioned in section seven is discussed: destination and content based information, later the other alternative of ideal types information needs is dealt with. The different types of destination information are discussed on what media to use best. Only destination based information is discussed here, since this type of information is received passively by the recipient. The medium for the transmittance of a message is dependent on the destination. The content information (product information e.g.) does not always have to be sent to a specific personal destination. However, also information can be sent to a database. This

database can be used by others to search for information on specific key words once they are in need of this information. The information richness theory (Daft & Lengel 1990, Hinds & Kiesler 1995) points out that the communication media used in organisations determines the richness of information processed. Daft & Lengel (1990) made a hierarchy of media richness, in which each media differs in feedback capacity, communication channels utilised, source and language. The richest form of information processing is face-to-face communication, since one has immediate feedback. With this feedback, understanding can be checked and interpretations can be corrected. Face-to-face communication includes non-verbal language, e.g. body language, facial expression and tone of voice that convey information beyond the spoken message. The second richest medium is the telephone, here feedback capacity is fast, but no non-verbal contact is possible. Written communications are less rich than telephone as a medium, since there is slow feedback, and only the written text is conveyed and visual cues are limited to what stands on paper. Addressed documents are of a personal nature and therefore somewhat richer than standard forms, which are anonymous and impersonal. Formal numeric documents contain the lowest richness factor, since they are impersonal and have no visual observation aspects. Numbers tend to be useful for communicating simple, quantifiable aspects of organisation.

Alternative I

One can also apply this hierarchy on the first alternative of destination and content information. Here one can see a difference in the fact to whom information is sent. Is the information sent to a large group, often the information is more impersonal and is not meant for interaction with the recipient. Therefore, one can state that information for a large group (global information) can be sent by a less richer medium than face-to-face communication, e.g. e-mail, fax or mail. Important is that all members can receive and read the message sent and this should be taken into account by the sender. The sender has to consider to whom the message is addressed and should, with help of this, choose which medium should be used. Furthermore, for more personal messages other media could be more suitable, depending on the content of the message. For messages that are complex, this means difficult to explain or sensitive messages, the sender might prefer to use a rich medium like the telephone or face-to-face media. However, when the message is a routine message, e.g. confirming a date of a personal meeting, one does not have to use rich media.

The above described is exemplified in table 3, where the destination and content information types are mentioned with examples of media forms that could be used when sending information in these situations. One can state that financial and logistic information can almost always be distributed with help of a medium with low richness. This information is not personal, feedback is not really important since only numbers and quantifiable aspects are mentioned. Therefore, formal reports sent by mail or fax should be able to inform all participants satisfactory. On the other hand the social information type is one that can almost only be distributed by rich media. In order to create a culture and a common vision within an organisation, people have to meet each other and have to learn to trust each other. This is almost only done by meetings in person on formal and informal occasions. As discussed in the section required information and communication, during the ISES conference it became clear that people discussed matters, defined ideas together and thought about co-operations during the informal part of the conference. Therefore, especially in a geographical distributed organisation it is important that people meet in person and use other rich media to work together.

Content/ Destination	Product information	Process information	Financial information	Other/logistic information	Social information
Individual information	Rich medium feedback important (face-to-face or telephone)	Rich medium/ moderate (team co-operations)	Moderate or low medium (budget and costs per project)	Moderate or low medium (numbers specified per project)	Rich medium (informal or personal contacts, face-to-face)
Global information	Low medium, no feedback, mass -communication (reports, fax)	Low or moderate medium. (developments of whole project in documents)	Moderate or low medium (Balance sheet)	Moderate or low medium (Annual report)	Moderate or rich medium, (invitation for a party by fax / letter or a conference)
External information	Rich medium for interesting partners. Direct feedback (Face-to-face or telephone, or articles (Low))	Rich or moderate medium, depends on partner	Moderate or low medium, (statement of account)	Moderate or low medium (Annual report)	Rich or moderate information depending on the external partner and his/her requirements

Table 3: matrix of the most suitable medium used for destination and content information types, alternative 1.

Within the focal organisation the product produced is research. As mentioned before the product research, is non-routine, non-standardised, personal and often very complex for outsiders. Therefore almost all communication (detailed communication) to the participants should be by using a rich medium. Since it is not always possible to meet each other in person, telephone is a very important medium and so is video conferencing for a group. For more administrative matters like formal and financial reports, a less richer medium can be used like a written report e.g. on a homepage. One important aspect with the focal organisation is that not all participants have access to e-mail, and internet. This complicates the distribution of information to all participants. Especially information about the whole organisation and information about conferences and other important aspects for the project, are decided to put on a homepage on the internet. This information might not be very personal, but has an important value for participants who are not placed in one building. By using internet for all formal and global information, participants know where to find information, and they still have access to all the details of the organisation. It is important that participants feel part of the organisation and therefore they should be able to find information they think is interesting for them. For security reasons, the focal organisation can put information only meant for participants in the ISES project in a secured area, e.g. intranet (is discussed in section 8.2). Within this network only members of the project have access to the information.

Alternative II

The same comparison with information richness can be done with the second alternative of information needs based on ideal types in the focal organisation. Below a matrix of these aspects is presented in Table 4. The matrix actually speaks for itself and does not have to be explained in more detail.

Information type/ Ideal type	Product information	Process information	Financial information	Other/logistic information	Social information
Client	Moderate/low medium (reports, articles)	Moderate/low medium, status reports about developments	Moderate or low medium (budget and costs in total, statement of account	Moderate or low medium (numbers specified per project)	Moderate medium (informal or personal contacts between clients, conferences)
Involved	Rich medium, face-to-face, discussions, conferences	Rich or moderate medium. (interaction between projects)	Moderate or low medium (research costs for sub-projects)	Moderate or low medium (Annual report)	Rich medium, team building sessions, co-operations, brainstorming sessions
Individualist	Moderate medium (reports, sometimes personal contact when needed)	Moderate medium, status reports about developments and interaction	Moderate or low medium, (wages, costs of sub-project)	Moderate or low medium (Annual report)	Moderate medium depending on the needs of the individualists

Table 4: *matrix of the most suitable medium used for information based on ideal types, alternative II.*

8.2 Communication and information technology

In order to see, how the above mentioned classifications could be used with help of information technology so that co-ordination is supported, more information about current information technology means is required. From literature it became clear that no specific medium was used for IORs, only media that is also used in hierarchical organisations is applied. Traditionally, the information system was seen as an individual system that could stand on its own next to the organisation. However, currently, opinions about this perspective are changing and the information system should form a matching whole together with the organisation structure. This idea is often only applied within traditional hierarchical organisations, since the structure of these organisations fits the structure of current information systems (both have a functional division). However, with flexible organisation structures, it is more difficult to have a tailor-made system that can support the organisation's flexible part, this is technically rather difficult to build. Most information systems have a functional decomposition that could be compared to a functional divided organisation structure. However, few information systems have another decomposition, e.g. object orientation. These new structures are becoming more popular, but still most organisations use the traditional system that has difficulty in adjusting to changing circumstances and that is often not compatible with other applications written with other decompositions. This thesis does not concentrate on this problem, but it only shows that most information systems are not suitable for a flexible and organic organisation as the focal organisation. Below, the most popular systems are mentioned that could support parts of the communication and information distribution of the focal organisation. These media are mentioned in order to give the reader an understanding of the media that is used on the market. Furthermore, the information system proposal mentioned in section nine could be exemplified by the below discussed applications.

Most media mentioned below is used for exchanging business information and office meetings (Parker 1996).

Exchanging business information

- *Electronic Data Interchange (EDI)*. EDI is defined as the computer-to-computer exchange of business information in a standard format and is often used for purchase orders. A more advanced definition is the exchange of business data among application systems in a standard electronic format, allowing, e.g. a company's purchase order system to communicate with another company's order processing system (Parker 1996). Unfortunately using EDI is a complex and expensive act, since exchanging business data mandates a review and redesign of the business processes and practices in order to use the standardised formats. Despite the difficulties companies implement EDI because it offers significant cost savings and could be used for just-in-time inventory, total quality management and zero-defect production.
- *Electronic Mail*: E-mail is a process which stores, sorts and sends typed messages between computers across a network. E-mail used to preserve mainframe-based systems and was difficult to install and to manage. Nowadays, an increasing number of companies is applying Local Area Networks (LAN) and are phasing out host-based e-mail systems in favour of LAN systems (Parker 1996). The applications of e-mail vary significantly from simple message sending to an area of workgroup computing. With workgroup computing a group of users can collaborate on shared information to create a form of e-mail conferencing. As mentioned in the thesis, e-mail is often used within the focal organisation, for short messages that are not complex. Furthermore, general messages meant for all project members are sent via e-mail, by using a mail-alias that can reach members that are specified.

Office Meetings

According to Parker (1996) electronic meetings have two key elements: software support and the meeting manager or facilitator who facilitates the meeting taking place. Electronic meetings need a conventional decision room equipped with personal computers and software, this allows people to present ideas, rank action items and document the meeting electronically (Parker 1996). Since people are spread geographically in the case study, the office meetings probably are often virtual meetings, where no meeting place is important. For virtual meetings it is important to enable people to tap in from various locations to attend the meeting electronically.

- *Groupware*: Groupware is a category of software that brings out the potential of a computer network for communications and co-operation on shared tasks. It is a collection name for computer programmes that make it possible for people, where ever they are, to have access to the same documents at the same time in order to update these documents. Furthermore, people are able to communicate with each other without problem. This soft- and hardware is to support people to co-operate. Some forms of groupware are electronic mail, electronic bulletin boards (which function is somewhat like electronic conference rooms in which many conversations can take place at once). Groupware can bring subtle changes in the culture of a company or at least a better understanding of how a particular corporate environment operates (Parker 1996). Often implementing groupware meant that cultures in the organisation were influenced, especially the culture of how people deal with information. Important is it to explicitly state the way people in the organisation relate to each other in software. Important is e.g. to decide who reports to who, and who has authority to add, change or remove something, because of this it is not very easy to install groupware into an organisation. Groupware encourages direct communication across organisation boundaries, and makes hierarchies change, therefore it could be suitable for an IOR. Groupware and video conferencing improves the overall effectiveness of an organisation (Parker 1996).

Electronic messaging

Electronic messaging is a combination of e-mail, facsimile and electronic data exchange. The technology used delivers the information when, where and how it is needed. Messaging cuts across all organisational levels, shortening the line of command as well as the psychological distance between top management and staff (Parker 1996). As a result, increased responsiveness to issues at hand contribute to the competitiveness of the organisation. Already progressive companies use electronic messaging to keep in touch with employees, customers and vendors overcoming barriers of distance and time and enhancing business relationships. Messages used to augment and complement voice conversations improve partner relationships and reduce the time and cost of decision making (Parker 1996). Electronic messaging is a natural extension of computer and communication technology.

Intranet & internet

Intranet is another very popular application that is used as an internal network within an organisation. Intranet also supports effective communication between individuals, groups and departments in an organisation. The network is a private network within one organisation between a number of specified members. The intranet application consists of all communication means and information distribution means mentioned above. The technology used for intranet is almost the same as used for internet, only internet is meant for a larger group. Intranet has some advantages. One advantage is the low cost because intranet is a meant to connect several applications together and uses the same technology and solutions as internet. Furthermore, intranet stimulates distributed computer power, intranet consists of several computers connected via a network. Several computers can be servers and others are clients. On the servers information and applications that are used by all clients are stored, while also the client can store own material only applicable for that specific client. *Internet* is the network that is meant for the whole world and companies can subscribe to it and can use the information put on the internet. The internet is not used for direct communication, but it is meant for serving as a large database with information that is often available for everyone. It is possible to connect the intranet network of an organisation to the internet network, so that the organisation also can communicate with partners outside the organisation. Within the virtual organisation it is difficult to see boundaries of the organisation, therefore, it is very difficult to state where the intranet network should be started and where the internet network begins. Internet is used within the focal organisation for presenting information outside the organisation EnerSearch. This information is especially meant for external partners and interesting persons. The clients often use internet to see if new finished results are presented there. Intranet is another application that one is planning to use in the ISES project. Here information for the sub-projects and internal information about ISES is presented that can only be read by members of the ISES projects and by members that are invited.

8.3 Proposal of information system

The reason why information is classified and placed in a matrix, is that the intention is to implement this classification in an information system in the focal organisation. This classification should simplify what medium could be used in order to send information to different types of destination and with different contents. Only classification alternative I is discussed in more detail here, since alternative II could be processed almost similar. After consulting some experts in computer science and software applications, the following application could be build with the classification of information mentioned before. The application or information system will consist of the normal e-mail, internet and intranet means (mentioned in section 8.2), but around these applications in the software a shell is build. This shell has the function of dividing information over several media and decides who should receive what sort of information. The normal e-mail,

fax and internet/intranet are still operational as usual so that messages from outside can come in as usual and members who do not want to use the system are not left out and are still able to communicate with other participants. An example is stated below of how such an application could look like.

Design of information system

The sender writes a message and before one sends it away one has to define to whom the message is meant (Destination) and what it is about (Content). The content can be specified into product, process, financial, logistics/other and business culture. The destination can be specified in individual, group, external groups and none, with the last specification is meant that there is no destination stated and information is saved in a database available for everyone within the project (with and intranet one can state that information is available for every member in the intranet group. However, one can specify which members can read the information and which members can not). Furthermore, one important aspect should not be forgotten, it might be wise for the sender to state that the message is a complex message. With a complex message is meant that a more social presence is important in order to interpret the message correct by the recipient. After defining these aspects, the message is send and the shell around the media applications processes the message in such a way that the right medium is used for the message sent. For example, when the destination is *individual* the system can state a message to the person for whom the message is intended. Since it is a personal message, the system only presents an invitation and the subject of the message. The recipient knows that the sender wants to contact the recipient, and if the sender does not contact the recipient directly by phone or other media, the recipient can contact the sender self. With global information, no personal information is sent. Therefore the sender defines destination as global and the sender defines the content. This message will automatically be placed on the web-page/intranet pages of the organisation by the information system. This information is placed on the internet, when it is also interesting for outside the organisation (this is something one should be able to state in the message). All participants do receive a message that global information has arrived on the homepage or otherwise. The last external group might be difficult to address with this system, since external partners are not part of the common system/server used within the organisation. Therefore, it might be important that personal messages to external partners are still done by regular e-mail, fax or telephone. However, messages for every one inside and outside the organisation, e.g. annual account, can be put on the internet homepage. This means that the application automatically translates the message or the report to HTML and puts it on the homepage of the project. Interesting is to see that when using such a system, the information handling system defines the boundaries of the organisation, since external members who are not part of the project do not have access to the system. The boundary less organisation mentioned in literature, re-gains its boundaries with help of technology. One can state that the organic organisation discussed in the thesis is often subject to change and therefore it is difficult to have a fixed structure in the organisation. On the other hand, people need some structure in their live in order to feel secure and to work efficient (Bosch & Bosch 1996). Therefore, one can view the future information system as the structure that can not be seen anymore in the physical organisation. The information system represents the structure of the information and communication streams, important in order to run a business. This structure is so relevant that members of the organisation can communicate with each other and they know the activities taking place in the organisation.

With this information handling system every person can choose for themselves if they want to deliver a message personally or not. Since members in an IOR gain much more responsibility and freedom to make their own choices, also participants should be able to decide for themselves if they want to have more contact with other members or not. The role of the participant changes

somewhat from the traditional employee's role, since people now have to actively search for information when required, and people have to state what kind of information they need and to whom they want to send it. Furthermore, participants are incited to play an active role in communicating and co-operating. This is not only the task of management, although management can stimulate this, but also participants should feel the obligation that co-operation is important for the future of their project.

9 Final remarks

In this chapter some guidelines for the focal organisation are presented. These guidelines imply matters that should be taken into account when solving the communication and co-ordination problems in the organisation. Furthermore in section 9.2 a short evaluation of the investigation is mentioned.

9.1 Guidelines

Within this thesis a classification of information and (partly) communication is made for the focal organisation EnerSearch. However, this classification can not be implemented right away when participants like the ideas mentioned above. First, some other aspects that were found in the investigation should be taken into account in the organisation and in the project ISES before one can start implementing an information system that supports communication, information distribution and eventually co-ordination. As mentioned before, there are several types of people present in the project ISES. These ideal types have different opinions about their assignment and their role in the project and behave subsequently different. Important for the ISES project is that these different ideal types are discussed and that one understands that there are differences in objectives, ideas and information needs between participants. Some participants are not even interested in co-operating with other members, although this is the aim of the project ISES. Therefore, it is important that participants first try to achieve a similar idea of the future of the project, this means a similar idea if one should together form a final project or if one should produce different small parts of a product that might fit together and maybe not.

Another aspect important in the organisation is the difference in traditional hierarchical organisation structures and organic structures. What is the ISES project for organisation structure, and what should it be or become, is one of the questions that should be asked. At the moment different opinions about the future of the organisation appear and these opinions are conflicting. Such conflicts in strategical matters make it difficult for participants to feel "one" with the organisation and to be motivated to do something about the situation. One can see that from the involved group, that was large in the beginning, now more and more people go towards the individualist type. People do not know their role in the organisation, people think that their voice is not heard and nobody takes initiatives to change the situation. People become passive and wait till the board of the focal organisation finally decides on something, that could have been decided differently when involved or individualist members were present.

All members agree on the fact that information distribution and communication problems exist in the focal organisation, and this makes it easier for the participants to understand that something should be done to overcome these problems. However, important is that one decides on what should be done and how this process should be started in the organisation. Is it management's task to decide on changes and implement them (more bureaucratic way of thinking), or can other members participate and help solving some of the problems (more flexible structure). It is impossible that all members participate in the change process, but some participation of representatives chosen by the operating core members, should take place in order to increase the

level of well-feeling in the organisation. At the moment already a number of operating core members have the feeling they are not able to influence processes or decisions, and this does not increase their motivation to work for the organisation. Therefore, participation of the members should be stimulated, so that decisions are made in order to solve the aforementioned problems. These decisions should not only be suitable for management and sponsors, but also for the ones who are affected by these decisions, the operating core.

These aspects of roles, decision-making and power should be discussed, before one starts to solve the information distribution and communication problems (and subsequently co-ordination problems).

9.2 Evaluation remarks

Since the investigation is meant to produce a master thesis, the research could only entail a small part of the field of the IOR. The field that is discussed in the thesis, is the communication and information stream of a geographical distributed and or a networking organisation.

The investigated study questions mentioned in the beginning of the thesis focus on a classification of information that supports information and communication distribution in a geographically distributed organisation. With help of this classification, means and media can be chosen that support the information stream in such an organisation. In the investigation, a classification is made and with help of the information richness theory, the best suitable medium is selected for certain information types. Unfortunately, as mentioned before, by defining information into a classification, not all aspects are taken into account that influence what is defined as information. For example, personality of people and the background of people plays an important role in defining what is information and how it should be spread. What is defined as information is rather personal for people, since not all people are interested in the same matters and can work with the same things. Therefore often information entails data that is applicable for a person and that might increase the knowledge of the person. An investigation in these aspects would take too long time for a master thesis, and besides that it is a very difficult process in order to understand the human brain.

Another aspect that is important to mention is the fact that the research of the case study took several months. This means that not only interviews were taken at one period in time, but also observations and conversations were held afterwards. Since the interviews were held in the starting phase of the organisation, not many participants knew their role. This changed slightly during the conference a couple of months later in time. These aspects are taken into account in the investigation. Unfortunately, a master thesis should only take a short period of time, and therefore it was difficult to do a longer study on the case study. A long term study is seen as a future perspective. In such a study one can compare the beginning phase with later phases and one can investigate what changes in the organisation. Since there is so little empirical information available on virtual organisations it is important that more empirical information is collected for IORs.

10 Bibliography

- Applegate, L.M., G. DeSanctis, B. Jackson (1995) *"Technology, teams and organisations: implementing groupware at Texaco,"* source Internet, USA.
- Arbnor, Ingeman & Björn Bjerke (1994) *"Företagsekonomisk metodlära,"* Studentlitteratur, Lund, Sweden.
- Argyris, Chris & Donald A Schön (1978) *"Organizational learning: A Theory of Action Perspective,"* Addison-Wesley Publishing company, USA.
- Baas, N.P.J.M., K. Anzenhofer, C.C.M hendriks, W. Hengeveld, J.A. Jongen, J. Kroon, G. Kuiken, G. Lindijer, E. Mulder (1988) *"Computer Netwerken,"* deel 1, 2, 3, en 4. Open Universiteit Heerlen, NL.
- Baker, E. W. (1993) *"The network organisation in theory and practice,"* in *Networks and organisations, structure, form and action*, ed. Nohria & Eccles, Harvard Business School Press, USA.
- Barnatt, Christopher (1995) *"Cyber business, mindsets for a wired age,"* John Wiley & Sons, UK.
- Behrsin, M., & G. Mason, & T. Sharpe (1994) *"Reshaping IT for business flexibility: The IT architecture as a common language for dealing with change,"* MacGraw-Hill, UK.
- Bell, J.(1993) *"Introduktion till forskningsmetodik,"* translated by B. Nilsson, studentlitteratur, Lund, Sweden.
- Bichall, D. & L. Lyons (1995) *"Creating tomorrow's organisation, unlocking the benefits of future work,"* Pitman, USA.
- Bosch-Sijtsema, Petra & Jan Bosch (1996) *"Virtual versus Physical: The Future?"* poster paper at the *DA/DSM conference 1996* in Vienna, Austria.
- Bowling Green State University, Master of Organization Development, Action research model: <http://www.cba.bgsu.edu/gradprg/mod/action.html> (1996).
- Brunsson, N. (1982) *"Företagsekonomi - avbildning eller språkbildning,"* in Brunsson, N., (ed.), *Företagsekonomi- Sanning eller Moral? Om det normativa i företagsekonomisk idéutveckling.* Studentlitteratur, Lund, Sweden.
- Collins (1991) *"Collins consise dictionary and thesaurus,"* Harper Collins publishers, UK.
- Daft, Richard L. & Robert H. Lengel (1990) *"Information Richness: A new approach to managerial behavior and organization design,"* Published in: *Information and Cognition in organization*, ed. L.L. Cummings, Barry M. Staw, Jai Press Inc., Greenwich, Connecticut, UK.
- Daniels, Caroline N. (1994) *"Information technology, The management challenge,"* Wesley Publishing company, USA.
- Davidow, H. & S. Malone (1992) *"The virtual corporation. Structuring and revitalising the corporation for the 21st century,"* Harper business, USA.
- Davis, S. & J. Botkin (1994) *"The coming of knowledge-based business,"* In *Harvard Business Review*, Sept-Okt, p. 165 -170.
- Denning, Peter, J. (1995) *"Can there be a Science of Information?"* In *ACM computing surveys*, Vol 27, No 1, March, page: 23-25.
- Easton, Geoffrey (1992) *"Why networks?,"* in *Industrial Networks, A New View of Reality*, edited by Björn Axelsson & Geoffrey Easton, Routledge, USA.
- Eneroth, Bo (1984) *"Hur mäter man 'vackert'. Grundbok i kvalitativ metod,"* Natur och Kultur, Sweden.
- Ericsson, D. (1993) *"Den informationsbaserade organisation,"* Televerket, affärssektor företag; Farsta, Halmstad, Sweden.
- Flückiger, Daniel, Federico (1995) *"Contributions towards a unified concept of information,"* Doctoral thesis of faculty of Science, University of Bern.
- Fulk, J. & G. DeSanctis (1995) *"Electronic communication and changing organisational forms,"* in *Organization Science*, Vol 6 (4) July-August, pp. 337-349.
- Galegher, Jolene & Robert Kraut & Carmen Egido (1990) *"Intellectual teamwork. Social and technological foundations of cooperative work,"* Lawrence Erlbaum Associates, USA.
- Goldmann, S.& R. Nagel & K. Preiss (1995) *"Agile competitors and virtual organisations,"* Norstrand Rheinhold 1995, USA.

- Grenier, R. & G. Metes (1992) "Enterprise networking, working together apart," Digital Press 1992, USA.
- Hamel, Gary (1991) "Competition for competence and interpartner learning within international strategic alliances," in *Strategic Management Journal*, vol 12, pp. 83-103.
- Handy, C. (1995) "Trust and the virtual organisation. How do you manage people whom you do not see?," In *Harvard Business Review*, May-June, p. 40-5.
- Hastings, Colin (1993) "The new organization, Growing the culture of organizational networking," McGraw-Hill Book Company, London, UK.
- Hinds, Pamela & Sara Kiesler (1995) "Communication across Boundaries: Work, Structure and Use of Communication Technologies in a Large Organization," in *Organization Science*, vol 6 (4) July-August, pp. 373-393.
- Hirschhorn, L. & T. Gilmore (1992) "The new boundaries of the boundaryless Company," in *Harvard Business Review*, May-June, p 104-115.
- Johansson Lindfors, Maj-Britt (1993) "Att utveckla kunskap. Om metodologiska och andra vägval vid samhällsvetenskaplig kunskapsbildning," Studentlitteratur, Lund, Sweden.
- Keuning, D. & D. J. Epping (1990) "Management en organisatie, theorie en toepassing." Stenfert Kroese, NL.
- Larsson, Rikard & Lars Bengtsson & Kristina Henriksson & Judy Sparks-Graham (1996) "The Interorganizational Learning Dilemma: Collective Knowledge Development in Strategic Alliances," Submitted to special issue: Managing Partnerships and Strategic Alliances, in *Organization Science*.
- Lea, Martin & Tim O'Shea & Pat Fung (1995) "Constructing the networked organisation: Content and context in the development of electronic communications," in *Organization Science*, Vol. 6 (4), July-August, pp. 462-478.
- Mintzberg Henry (1983) "Structures in Fives: Designing Effective Organizations," Prentice-Hall International Editions, USA.
- March, James G. (1991) "Exploration and Exploitation in Organizational learning," in *Organization Science*, February, Vol 2 (1), pp. 71-87.
- Morgan, Gareth (1980) "Paradigms, metaphors and Puzzle Solving in Organization Theory," in *Academy Science Quarterly* no. 5, pp. 605-622.
- Nohria, N. & R.G. Eccles ed. (1992) "Networks and organisations, structure, form and action," Harvard Business School Press, USA.
- Nonaka, Ikujiro, (1994) "A dynamic Theory of Organizational Knowledge Creation," in *Organization Science*, Vol 5, No. 1, February.
- Oliver, Christine (1990) "Determinants of Interorganizational Relationships: Integration and Future Directions," in *Academy of Management Review*, Vol. 15 (2), pp. 241-265.
- Parker, M. M. (1996) "Strategic transformation and information technology: paradigms for performing while transforming," Prentice Hall, USA.
- Parkhe, Arvind (1993) "Strategic Alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation," in *Academy of Management Journal* 1993, 36 (4) pp. 794-829.
- Patel, Runa & Ulla Tebelius (red) (1987) "Grundbok i forskningsmetodik, kvalitativt och kvantitativt," Studentlitteratur, Lund, Sweden.
- Power, Richard J.D. (1992) "Cooperation among organisations. The potential of communication supported cooperative work," Research Reports, ESPRIT volume 1. Springer Verlag, USA.
- Scott Morton, M.S., ed.(1991) "The corporation of the 1990s. Information technology and organisational transformation," Oxford university press, USA.
- Sebeok, Thomas (1996) "Communication," Source: internet: ftp://etext.archive.umich.edu/pub/Zines/SEMA/sema_seb.txt
- Sproull, L. & S. Kiesler (1991) "Connections. New ways of working in the networked organization," MIT press 1991.
- Tapscott, D. & A. Caston (1993) "Paradigm shift, The new promise of information technology," McGraw-Hill, USA.

- Taylor, D. (1992) "*Object-Oriented Information Systems. Planning and implementation,*" John Wiley & Sons, USA.
- Thompson Jr., Arthur, A. & A. J. Strickland III (1992) "*Strategy formulation and implementation. Tasks of the general manager,*" Fifth edition, Irwin inc., USA.
- Thorelli, H.B. (1986) "Networks; between markets and hierarchies," in *Strategic management journal*, 1986, 7, pp. 37-51
- Wiio, A. Osmo (1973) "*Kommunikation- vad är det? En grundbok om information, språk och massmedier,*" Svensk bearbetning av Kjell Nowak, Svensk utgåva, bokförlaget Natur och kultur, Stockholm, Sweden.
- Yin, R. K. (1994) "*Case study research, Design and Methods,*" second edition. Sage publications, UK.
- Åstrand, A. (1992) "*Informationskunskap, en introduktion,*" Almqvist & Wiksell, Ekonomiförlagen, Malmö, Sweden.

11 Appendix

11.1 Sub-projects of ISES

Summary of the nine research sub-projects in the ISES project of EnerSearch AB.

1) New Business strategies

Theme: Strategies for two-way customer and market communication by means of interactive information systems. A dialogue model with help of dynamic decision styles is developed in order to increase customer relations and the value creation in the exchange between customer and supplier.

Goals: to understand the customer by applying decision styles theory of (Driver et al. 1993). Second goal is to bring customer satisfaction, by asking what kind of product do customers need.

2) The customer interactive interface (small entrepreneurs)

Theme: To increase usage, acceptance and design of information gateways in society. The project concentrates on applied techniques for the presentation, input and the processing of required information on an easy and attractive way for the user.

Goals: First technological problems are investigated, how should one get information. Secondly, an integration with the EnerSearch server should be made and thirdly an interface for the customer is developed.

3) Databases and standardised interfaces in an information system

Theme: Analysis of the utilisation of the information networks and functionalities in the communication networks by using standardised databases, interfaces and document handling.

Goals: First investigation is done in standardised electronic documents, in order to know what kind of information one needs. Secondly, storage and access of information questions are dealt with and after that standardised databases are developed.

4) Virtual Organisations

Theme: Models for increasing co-operation, communication and interorganisational learning within organisation where members are distributed geographically.

Goals: Investigating EnerSearch and its projects as an interorganisational co-operation and apply decision styles on this organisation.

5) Simulation of energy systems

Theme: Computer simulation of energy systems for the analysis of cost minimisation over a selected period of time, where investments, depreciation and operating costs are taken into account.

Goals: A field study is done within Ronneby Energi AB. Secondly, customer relations and practical applications of the computer simulation programme are investigated.

6) Energy system computer technology

Theme: Analysis of the opportunities for utilising a control system, in combination with communication on the local electric power network for increased technical and market oriented functionalities.

Goal: The goal is to understand and apply the needed and available technology.

7) Communication on the low voltage network

Theme: Analysis of criteria characterising the electrical low-voltage network as communication media.

Goals: First, one should understand the different types of media. Secondly, a study of parallel technology is planned.

8) Distributed load steering

Theme: Automated distributed load control for increased utilisation of present investments in existing distribution grids.

Goals: Investigating agent technology as tools to optimise technology systems.

9) Distributed decision islands

Theme: Analysis of beneficial opportunities in distributed, intelligent "decision islands" based on micro computers in local networks.

Goals: Investigating agent technology as a tool for value added services to the customer.

11.2 Theoretical background

11.2.1 Communication theory

Communication is defined as all activities through which information, e.g. data, wishes, thoughts, facts and emotions, are transferred to, or discovered with other people (Keuning & Epping 1990). Communication is seen as a process consisting of a number of steps between a sender and receiver via communication means. It is a process in which the sender and the receiver stand across each other in a mutual interaction, in order to reach conformity (Keuning & Epping 1990). The authors state that a good communication consists of a two-way manner, in which, after receipt and interpretation of a message by the recipient, feedback has to take place in order to test the reaction and the translation of the receiver with the original meaning of the sender's message. Often communication is influenced by non rational factors, e.g. people who do not listen, people who are prejudiced or frustrated, and this can cause mis-interpretations of the message that was sent. Important is also that the interpretation of messages and data is correct, for example, when a message is translated or interpreted in a different way than the sender had in mind, the delivery of the message is disturbed in such a way that it is possible that action is taken with the mis-interpreted material. Effective communication requires an interactive way of 'traffic' and also a willingness to listen and to speak. Often people do not listen carefully, do not formulate their message properly and do not take into account that miss-interpretation is possible, this often leads to mis-communication and mis-understanding between the sender and the recipient. A distortion of the message or information sent or received can take place because of two reasons:

- *Environment factors*: for example noise in a factory plant or geographical distribution of employees (technical factors).
- *Human factors*: here one can divide between two notions: *intellectual* factors (e.g. forgetfulness) and *emotional* factors (fear, frustration, prejudice, selective observation).

In order to understand communication, one has to go back in history to point out some important communication models. Especially, in the late 1940's and 50's communication models have been developed by Lasswell, Shannon, Schramm, Katz and Lazerfeld (Flückiger 1995). These models all contributed to current communication theory, therefore it is important to state some of these models. These models can simplify the flow of communication and can help to make a classification of information. Claude Shannon presented a statistical method for defining communication and for defining channel capacity (how much information could be sent via a communication medium). Although his model was meant for machine communication, a lot of other researchers have used his model in other disciplines. Shannon discusses a communication system, this system consists of the following aspects (Flückiger 1995). To begin with the system starts with an information source, which produces messages intended for a particular destination. The message is sent to a transmitter, that produces a sequence of signals for transmittance over the channel. The channel is the medium used to transmit the message/signal to the receiver, during transmittance a disturbance (noise) can occur. The receiver of the message performs often a reverse operation to the transmitter, reconstructing if possible the original message from the signals. Last item is the destination of the message, which can be a person or a thing. However, it is irrelevant for the definition of information to measure channel capacity, but only interesting is *that* information has been sent and *what* it consisted of. The model of Shannon is used as a basis in a number of communication theories. However, one thing that is lacking in the model mentioned above, that has been mentioned by Shannon's followers is the possibility to have feedback in the communication model. This feedback can be seen as a reply or acknowledgement from the recipient in which one can check if the communication has been satisfactory.

Wilbur Schramm, 1945(described in Flückiger 1995) also produced several communication models, only one model is mentioned here, since this model is also applicable for the investigation. In this model Schramm states that, "without a common background and culture, there is little chance for a message to be interpreted correctly". He states that an experienced communicator is attentive to feedback and constantly modifying its messages in light of what the person observes in or hears from its audience. Hence the roles of sender and recipient are taken on by both parties, and communication becomes circular. The author of

the thesis agrees with the latter person, since it is very important that people sent messages to each other and use the same context. When there is a different context, or language or culture, messages can be misinterpreted by the recipient.

Sebeok (1996) has taken a different approach in defining communication. He states that communication can be regarded as the transmission of any influence from one part of a living system to another part, thus producing change. It is messages that are being transmitted. The author claims that it is this capacity for containing, replicating, and expressing messages, that distinguishes them from the non-living. Sebeok (1996) discusses the function of messages as various, they are end-directed in the same way as all animal behaviour is goal oriented. Another important aspect to be mentioned is the setting in which any message is emitted, transmitted and admitted always decisively influences its interpretation and the contexts of transactions itself, continually undergoes modifications by the messages being interpreted (Sebeok 1996). Messages are *context-sensitive*. The term context refers to the organism's cognisance of conditions and manner of appropriate and effective use of messages. Context is often the crucial factor in resolving the significance of a message and it will often determine whether the destination will believe or disbelieve the message received.

11.2.2 Information Theory and redundancy

Information is a notion that is used often, but hardly defined. In order to make a classification of information one should first be able to define information. Therefore several researchers are presented below who have discussed the concept. According to (Denning 1995) most people distinguish between information and data, where data represents information or encodes it. Mathematical definitions of information have been used by communication theorists and software engineers use metrics like size and bandwidth. (Denning 1995: 23) defines information as:

"referring to human assessments that statements or signals have altered possibilities, increased knowledge, answered questions, or reduced uncertainties: calling something information is already a declaration of value to the beholder".

Information is defined by a number of mathematicians and statisticians, e.g. Wiener who states that information is not matter, nor energy, but information is information. Shannon tries to define it with statistical methods for calculating the channel capacity for sending a message. As one of many authors, Fred Dretske (in his book: knowledge and the flow of information) uses Shannon's theory in order to explain how knowledge is gained. He states that knowledge is considered as a complete act of information. He states that information increases knowledge. According to Dretske knowledge is only composed of factual and true elements, therefore he only accepts true statements as information.

According to (Flückiger 1995), Donald M. MacKay is a forgotten author who tried to define information independently of Shannon (most authors defined information according to Shannon's communication theory). MacKay presents a descriptive information theory in the assumption that information is linked to an increase in knowledge. According to MacKay, we have gained information when we know something now that we did not know before. The cybernetic Doede Nauta Jr.(Flückiger 1995), also claims that information is news, what is known already is no information. He states that something is information to the extent that it is unknown, unexpected, surprising or improbable.

Redundancy is the probability with which certain elements appear within a certain context. The more probable the appearance, the greater the redundancy and the orderedness of the individual element. Seiffert (described in Flückiger 1995) places redundancy into a new light, where communication theorist think it is an annoying side effect of inefficient coding, communication is according to Seiffert only possible through the presence of redundancy (Flückiger 1995). Seiffert states that redundancy is not only coded, but also those transmitted elements that are already known to the receiver in a given communication system are redundant. This means that an object consists of objective information (everything the receiver can know) and subjective information (what the receiver does not know about the object yet). The redundancy process does make the world 'deficient in information', but it also allows one to establish new relations.

Other authors also defined redundancy and combined it with the notion information. Åstrand (1992) presents a classical information theory and places information on a line between *Entropy* and *Structure*. Entropy is the lowest degree of ordering or structure and can be seen as chaos, the structure means that information is recognised and structured in a certain way in order to use it. (Åstrand 1992) defines information as coded variation, this means that information in its simplest form can be a page number of a book and in its most complex form it can be too difficult for humans to see a connection. When one finds new information this includes a surprise moment. The author uses the example of an artist who codes something surprisingly in a painting (his fantasy and way of perceiving the world) and when the observer understands the meaning of the painting he has cracked the code of the painter and can structure the found information. The author states that in order to structure the information, redundancy is important. Redundancy is defined by Åstrand (1992) as a coded variety/multiplicity that is available when requested, especially in order to protect the message from noise” (noise can make the message difficult to understand). The more redundancy in a stream, the less information and the other way around, the more entropy the more information. However, redundancy is important for people in order understand and interpret the message. According to (Åstrand 1992) redundancy is an example of the values and norms that we have created, e.g. politeness rules, without these rules it would be difficult to understand the message.

11.3 Letter for the inquiry

Below the letter is shown that is enclosed with the enquiries sent to the participants. In the letter the investigation is explained and the interviewee is asked for co-operation. Important is to understand that the inquiries sent in advance are only seen as a helping hand, so that the interviewee knows the subject of the investigation.

Dear Madam, Sir,

We are writing to you concerning your role as participant in EnerSearch and the ISES project. Sub project 4 in ISES is going to devote its attention to Virtual Organisations. The objective with the project is to develop methods and technology to support business processes in a distributed organisation, such as the ISES project organisation. This will be done interdisciplinary, with participants from both business administration and the computer science discipline. The current state of the project is two ongoing master projects which aim to create a common ground of understanding around the concept of a virtual organisations, its members, its customers and the information technology needed to actively support such an organisation.

One possible definition of a virtual organisation is a temporary network of independent companies/partners in which the partners share skills (core competencies), resources, costs and risks in order to provide the market with synergetic solutions to customer's demands. We believe that this covers the business scope of the ISES project organisation very well. One of the goals with the sub project virtual organisations is to develop information technology to bind the ISES project organisation together. By doing this we hope to maximise the possibilities for the members in the ISES project to grasp the results of the different sub projects. We will now very briefly describe the content of the master projects.

The first master thesis is within business administration and concentrates on distributed virtual organisations. The master thesis will focus on information handling and communication within a virtual organisation where members are distributed geographically. Important is to investigate how information is classified and what information and communication is important in order to achieve the best results and solutions for the customer of the virtual organisation. Especially within a distributed organisation it is important that means of communication and information transfer are defined, in order to create the synergetic effect of the combination of core competencies and skills of independent partners.

The second thesis has a technology focus. The objective is to develop a framework with the capability to support the design of an active information infrastructure for a virtual organisation. We believe that an geographically distributed organisation will put new demands on its information technology. If information technology is the glue that binds the organisation together it must be transformed from being a passive entity in the organisation to more actively taking part in the processes of the organisation. The technology must in an active or perhaps even

pro-active way support its users. To do this we will, with help of an interview, collect data and thoughts concerning the use, and potential use of information technology for communication within the ISES project organisation.

To be able to work with matters concerning virtual organisations and information technology stated above within ISES we need to collect data from the project members. The idea is that we would like to hold interviews in person or by phone with both sponsors and members in the sub projects. This letter contains some questions of interest for us. If you have any questions at this stage please contact us. We would appreciate it if you would participate in the interview. We will contact you in the nearest future in order to make a possible appointment for an interview.

We would like to thank you in advance for your participation

Yours faithfully,
Petra Bosch

11.4 Inquiry questions

As mentioned before, the inquiry questions mentioned below are sent to the interviewees. However, these questions are only meant to show in what kind of aspects the interviewer was interested. With the interviews this list of questions was sometimes not even looked upon.

EnerSearch and ISES:

1. How do you see EnerSearch, how would you describe EnerSearch (e.g. organisational type, structure etc.) ?
2. Can you view EnerSearch as a virtual organisation?
3. What do you think is the target of EnerSearch and the project ISES?
4. Is there a common vision within EnerSearch and do you think this is important?
5. Are all members aware of this vision and do they strive for achieving it?
6. Do you know the long-term strategy of EnerSearch and do you know what will happen after 3 years?
7. How would you describe your role within EnerSearch?
8. What is the reason for you joining the project ISES?
9. Could you describe the management style within EnerSearch (e.g. hierarchical, supporting, interactive)?
10. How is the contact with the rest of the organisation and with other members?
11. Is there any co-operation or contact between members?

Information and communication within EnerSearch:

1. What kind of information transfer and communication would you describe as ideal in EnerSearch, and is this also the case within EnerSearch?
2. Who should receive what kind of information according to you? (specification to Individual, group, whole project?).
3. Are there currently problems with handling information within EnerSearch and how are they solved by you? Could you give a specification of the main problems?
4. What do you think is important information that should be distributed in the organisation ?
5. What sort of information is distributed in reality? Is this enough to achieve the common vision?
6. How is information distributed internal and external (e.g. broadcasting, multi-casting or through personal contact)?
7. Could you state how much time you spent on administration, research and other tasks (what other tasks?) for the ISES project?
8. With the specification made above can you state how much information handling and communication with other members is important in order to do the work? Is there a difference in the amount of communication and information transfer depending on the work done?

External information and communication:

1. How is your contact with members the project ISES)? Could you describe this contact?
2. What information is distributed to sponsors and owners and what information is distributed within EnerSearch?
3. How and in what way does the sponsor/owner use the material from the ISES project?
4. Are there any meetings or other activities arranged, so that sponsors, owners and project leaders and members can meet each other? Is this important?
5. Are the sponsors aware of a common vision in the ISES project?

Thank you for your participation.