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A Framework for the Design of Organizational Decision Support Systems

- A Theoretical and Practical Study, Focusing on Group Decision Support, Knowledge Management and Means of Communication in Organizational Decision Support Systems.

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List of Abbreviations

AFSS	the Administrative Faculty for Social Sciences (at Gothenburg University)
AI	artificial intelligence
API	application program interface
ASP	active server pages
CBIS	computer-based information system
CEO	chief executive officer
CGI	common gateway interface
CMS	case management systems
DBMS	database management system
DSS	decision support systems
EIS	executive information systems
ES	expert systems
FGSE	the Faculty for Gothenburg School of Economics (at Gothenburg University)
GDSS	group decision support systems
GSM	the global system for mobile communications
GSS	group support systems
GUI	graphical user interface
HLR	home location register
HTML	hypertext markup language
ICQ	"I seek you"
IGM	interacting group method
JVM	Java Virtual Machine
LAN	local-area network
MBMS	model base management system
MO	mobile originated
MSS	management support systems
MT	mobile terminated
NGT	nominal group technique
ODSS	organisational decision support systems
OMS	organizational memory systems
OS	operating system
PDA	personal digital assistant
PERL	practical extraction and report language
SEU	subjective expected utility
SKF	SKF Technical Service and Maintainance
SKF TFO	SKF Trouble-Free Operation programme
SMS	short message service

SMSC	short message service center
SSI	server side includes
UIN	user identification number
WAN	wide-area network
XML	extensible markup language

Abstract

Making the right decisions and being able to learn from past decision making is important for companies and organizations. Different kinds of support systems, communicational means and management of knowledge can help in achieving this end.

Against a background of theories in these and related research areas, this thesis covers a practical and a theoretical part, - the building of an organizational decision support system (ODSS) prototype and an empirical study of current and preferred practices of group decision making, organizational decision support and knowledge management in two organizations. On basis of the findings, a framework for the design of organizational decision support systems is proposed.

1. Introduction

This first chapter of the thesis covers the background to, and a presentation of the research problem. The purpose of this first chapter is to give the reader an overall presentation of the study; why we have found the subject interesting, what the essay will cover, and more specifically, what the purposes of the study are. Finally, an outline of the thesis and a short disposition of the remaining chapters are presented.

1.1 Problem background

"Life is full of choices, of decisions. Even deciding not to decide is, of course, a decision. Every time that you decide to let events, other people, or rigid custom/tradition make your decision, those factors (compassionate or not) will control the outcome. Your role will be limited to deciding how to react (positively or negatively) to those outcomes."

The words are Theobald´s (1987) on the question of why decision making is important. If one thinks about it, almost all actions by any individual or company are preceded by a decision, well prepared or not. Making the right or wrong decisions mean the difference between survival or death, profit or loss for organizations and companies in a competitive market. Decisions make a difference. Decisions are important.

Since making the right decisions is of crucial importance for companies and organizations, methods and techniques with the objective of giving support for decision making has received more attention recently. Such methods and techniques are often categorized as methods for decision support and systems designed for this purpose are often categorized as decision support systems (DSS).

Due to the rapid development of distributed computer systems, data communications, the Internet, intranets and extranets, the field of decision support systems is moving from being primarily a tool for personal support, to be a shared resource in and across organizations. This development from single- to multiple-user decision support, has given meaning to another term, - the concept of organizational decision support systems (ODSS) which is a DSS that focuses on an organizational activity or task which involves a sequence of operations and actors (Hackathorn & Keen, 1981).

A recent trend in DSS development, apart from the mentioned broadening of scope from individual to organizational use, is the use of decision support tools in an Internet environment with an easy to use, flexible, standard interface. Also, new theories and developments in areas usually termed ”organizational learning” and ”knowledge management” have made it possible to better utilize the entire organization´s accumulated knowledge and expertise in dealing with problems encountered in the marketplace of firms, independent of time and space (Turban & Aronson, 1998). These developments have made it possible for managers to more easily communicate with each other, access accurate information quicker and more efficiently, and more easily create lasting knowledge for the organization. These developments have also made it possible for decision makers to make better decisions and therefore, an understanding of the issues imposed by these developments are of crucial importance for the quality of decision making of companies and organizations.

Against this background, this thesis focuses on three related ODSS areas, - decision making in organizational, knowledge creation and management, and means of communication in organizational decision and knowledge management.

1.2 Research Problem, purposes and delimitations

Decisions and support for decision making and proper management of existing knowledge are important issues for companies and other organizations. How are these issued coped with today in organizations, and by which means? How could these issues be handled and which technologies are suited to do so? Under which circumstances? These are some central questions which can be addressed, and some of these questions this thesis hopefully, at least partly, can provide answers to.

In section 1.2.1, the purposes of this thesis are presented. This section is followed by a theoretic discussion on different kinds of purposes in section 1.2.2. This section mainly builds on works by Wiedersheim & Eriksson (1991). In section 1.2.3, these theories are contrasted to the purposes of this study. In section 1.2.4, delimitations of the study are discussed, and finally, in section 1.2.5, a disposition of the study is presented.

1.2.1 Purposes

The following are the purposes of this thesis based on the background of the study presented in this chapter:

An overall purpose of the thesis is:

*** To propose a framwork for the design of organizational decision support systems.**

In addition, the following are some additional purposes:

1) *** To study some available theories regarding organizational decision making, knowledge managemant and means of communication techniques which can support organizational decision making.**

2) *** To empirically study organizational decision making and knowledge managemant in two chosen organizations with regard to:**

i) **How decisions are made today in the organization.**

Questions which can be asked are for example: who makes the decisions? How is an issue normally initiated?

ii) **Current use and practices of organizational decision support systems and knowledge management, means of communication techniques in support of organizational decision making.**

Questions which can be asked are for example: Are there any ODSS in use in the organization? If there is, how is it used? Is there a policy for how knowledge should be managed? Which communicational means are used facilitating organizational decisions?

iii) **Preferred use and practices regarding organizational decision support systems and knowledge management, means of communication techniques in support of organizational decision making.**

Questions which can be asked are for example: What kind of facilities not used in the organization today, would enhance the decision support in the organization? How could knowledge be better managed in the organization than it is today? How could this be accomplished?

Further, in order to facilitate the empirical study and learn more about different organizational decision support technologies, knowledge management as well as different technical options regarding means of communication supporting groups of decision makers, a related purpose is:

3) * To build a functional, small, web-based organizational decision support system prototype with capabilities in the areas of knowledge management and organizational decision support, providing different means of communication techniques in support of organizational decision making.

Since the study of theories is essential for both a better comprehension of the empirical study as well as the construction of the ODSS prototype, we have chosen to cover many research areas and a large range of theories as a consequence of purpose one in order to facilitate the understanding for purposes two and three. Also, since the focus of this study is twofold in that it covers practical/technical as well as theoretical issues and it is possible that a reader of this essay who is specialized in either of these areas therefore might find certain issues difficult, we have chosen to present the wide range of theories corresponding to purpose one in a more pedagic, extensive way than otherwise would have been chosen.

1.2.2 Categorization of purposes (Wiedersheim & Eriksson, 1991)

According to Wiedersheim & Eriksson (1991), purposes of a study can be of different kinds. These different kinds do not exclude one another. On the contrary, in order to better understand a problem and see it from different angles, it is very common that different kinds of purposes are combinated in a study. The five groupings of purposes which Wiedersheim & Eriksson (1991) identifies, are descriptive, explanatory, comprehending, predictive and determining purposes.

Many studies have as their purpose to describe different kinds of phenomena. The purpose can be to describe events, such as a marketing campaign, states/conditions, for example an organization with a formal organization plan, courses of events, for example a negotiation process, and actions, such as a delivery of goods.

Descriptive studies are done, as all other investigation work, from different kinds of starting points. To describe implies a choice of aspects, terms, concepts and perspectives as well as a choice of how to register, systemate, classify and

interpret information etc. A descriptive study is often a necessary point of departure in order to explain, comprehend, predict or determine.

As in the case of descriptive studies, explanatory studies are made from different kinds of starting points. It is important to specify which these starting points are and also inform what an explanation should be used for and for who it shall be done. According to Wiedersheim & Eriksson (1991), there is not one true model with regard to a particular phenomenon. This implies that the researcher must consider using many different models. Of this follows, that it is impossible to get a complete explanation by simply using one model.

To understand or comprehend is a purpose which is often difficult to specify. This could mean different things depending on the investigator´s point of departure in his or her studies. In a positivistic regard, comprehending could mean the creation of models for description and explanation, i.e. models which provide understanding. Understanding can be reached by interpretations from a frame of reference. The frame of reference puts these interpretations in a context which makes them more easy to understand. In a hermeneuistic regard, on the other hand, understanding takes place through an interplay between an understanding of the whole and an understanding of parts of the problem.

Predictive studies make use of prognoses in order to seek knowledge about what is going to happen in the future. The word prognosis is Greek and means "knowledge in advance". In prognoses, the predictions of the future are based on those assumption which were made in the modell, and a prognosis does not state whether a particular event will occur in the future, it rather states which circumstances must be fulfilled in order for the event to occur.

A final kind of purpose indentified by Wiedersheim & Eriksson (1991), is to use, what they call, determining purposes. Purposes of this kind, take their departure from the assumption that decision making is goal-oriented and that the decision maker chooses among different alternative courses of actions depending on how well these are apprehended as congruent with the goals. These goals can be represented by variables in a model, but it is also possible that the goals lie outside the model. In order to be able to use a model for determination or decision, there is a need of formulating a decision criterium which is related to the goals.

1.2.3 Categorization of purposes used in this study

In accordance with the theories of Wiedersheim & Eriksson (1991), the overall purpose of this study, to propose a framework for the design of organizational decision support systems, can be classified as a comprehending purpose. The

objective here is to create a model for description and explanation in order to increase understanding.

The first additional purpose of this study, to study some theories in the research areas of organizational decision making and support, knowledge management and means of communication in organizational decision support systems, can be classified as a descriptive purpose where the objective of the purpose consists of finding a theoretic base to contrast the empiric study in purpose two and the practical/technical purpose three with.

Purpose two is an explanatory purpose according to this categorization of purposes. Here the objective is to try to find explanations of *why* the studied organizations use the kind of organizational decision support, knowledge management philosophy and so on, that they use and relate this information to the theories presented in connection to the first three purposes.

The final purpose, to build a functional, small, web-based organizational decision support system prototype with capabilities in the areas related to the three main areas of this study, is supportive to purpose two described above. By building a small system prototype by ourselves, we increase our practical knowledge of how an organizational decision support system can work in reality. We can also have informants try out the prototype and come up with comments on how it works as well as suggestions for improvements. In this way, we hope that we can improve the communication with the informants about the different issues involved in the empirical study and thereby improve the results of the empirical study.

Viewed like this, the third purpose of building a small ODSS prototype, can be categorized as a purpose with the objective of increasing understanding, - for us as researchers, regarding the practical possibilities and limitations with this kind of system, for the informants in the form of a communication tool and hopefully, a source of inspiration about what can be done technically to improve organizational decision support.

1.2.4 Delimitations

Regarding delimitations of this study, it is important to emphasize that the thesis does not lay claim to suggest final solutions to all problems involved in decision making, knowledge management and decision support in organizations. These issues are so complex, it is probably impossible to come up with general solutions applicable to all kinds of organizations. Rather, the essay is descriptive in nature and focuses on decision making, knowledge management and decision support in the organizations involved in the empirical study, where we hope our

study can give an overview of how these issues are managed in the two organizations described and how the members of the decisive bodies in the organizations would prefer these issues to be managed.

Another delimitation of the study concerns the small, web-based organizational decision support system prototype we have constructed. In this system prototype, we will not be able to test all possible forms of support for knowledge management, communication tools in organizational decision support systems and knowledge management etc. Instead, we will concentrate on those features which are most common and especially focus on those technical solutions which are possible to implement in an Internet-based computer environment and which we are capable of implementing given our technical competence.

Another rationale for focusing on techniques which can be implemented on the Internet is due to the fact that the Internet as a platform for group decision support and knowledge management is subject to increasing use in modern organizations and companies (Ewert, 1998). In the empirical study, we will also concentrate on these techniques and not study all possible techniques possible to implement in this kind of system.

1.2.5 Disposition

As mentioned, this study consists of a theoretical as well as a practical part. The theoretical part consists of the presentation of the theories and the practical part consists of the construction of the small, web-based, ODSS prototype as well as the empirical study in the form of "field work", i.e. interviews, questionaries, and presentations.

The work with both these parts has been conducted in parallel, and an overview of how this work has been conducted as well as the chronology of the work, can be illustrated by figure 1.1 below.

The relations between the practical and theoretical parts of the study can be visualized in the following way (see figure 1.2 below). The objective of the theories in the theoretical frame of reference is to clarify and describe decision making and the decision making process. Then, by constructing an ODSS prototype on basis of some of the theories presented in the theoretical frame of reference, we hope to achieve an ODSS prototype that supports decision making in the way these theories prescript.

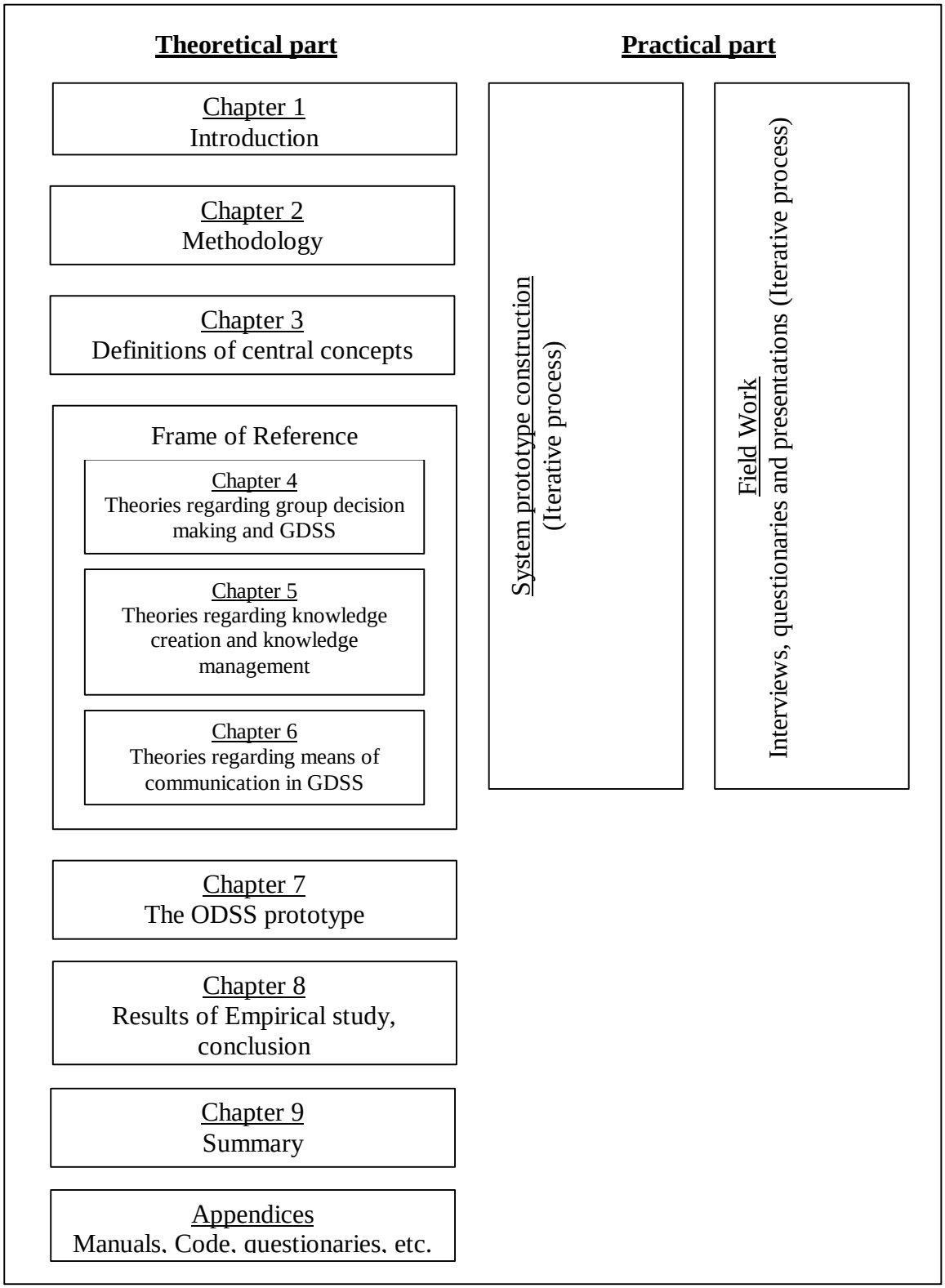


Figure 1.1 Disposition

The theoretical part of the study, consists of the following subparts:

In this chapter, - chapter 1, the background to the study as a whole has been given. The research problem has been presented as well as the purposes and delimitations of the study. The objective of this first chapter has been to give an introduction to the thesis as well as a disposition of the following chapters.

In chapter 2, we present different possible research methods and motives behind the choice of research methods. Also, possible data collection procedures as well as motives behind the choice of data collection methods are covered. Finally, criticism of sources, validity and reliability regarding the chosen data collection methods and their realization are discussed.

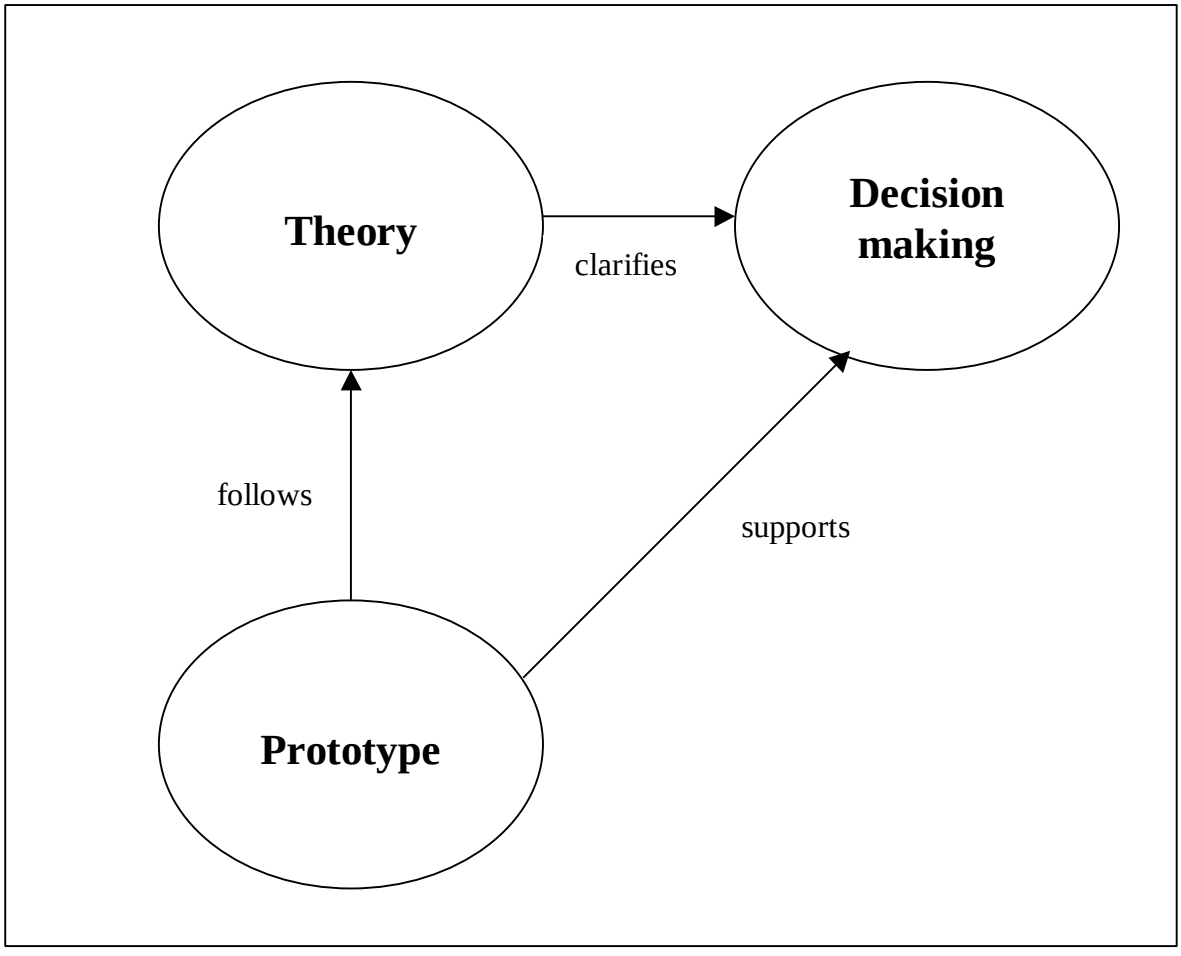


figure 1.2 A Conceptual model of the research process

In chapter 3, some central concepts related to the theoretical issues studied in the thesis are presented. This chapter is intended to bring clarity regarding what we mean by certain terms which are used differently by different researchers and in different contexts. Since this chapter deals with definitions of theoretical terms which are used in the theoretical chapters 4 to 6, chapter 3 can be regarded as an initial frame of reference for these three chapters.

Chapter 4 is the first chapter in the theoretical frame of reference. In this chapter, theories on one of the study´s main research areas, - organizational decision making and organizational decision support systems are presented and discussed.

Chapter 5, continues with theories regarding knowledge creation and knowledge management in an organizational context and the frame of reference is concluded with chapter 6, which presents research in the area of means of communication in group decision support systems.

These theoretical chapters present different alternative research models in each research area, and these research findings are then used as a basis for the analysis of the small, web-based, ODSS prototype in chapter 7 and the empirical study in chapter 8. There, presented research findings from chapters 4 to 6 are contrasted with our own experiences and findings regarding the ODSS prototype and the empirical studies of the two organizations.

In chapter 7, we present the small, web-based organizational decision support system prototype and give a short summary of the features included in the four subsystems. The overall objective of this chapter, is to give an overview of the system prototype´s functionality and the purpose of the different functions available in the system.

In chapter 8, the results of the empirical study is presented and analyzed. In this chapter we also conclude the thesis by going back to the purposes proposed here in chapter one and try to relate these to the empirical findings. We also give suggestions for further research related to the research areas covered in the thesis.

Finally, in chapter 9, a short summary of the thesis is presented.

The practical part of the study consists of two subparts which are in progress in parallel throughout the study. These are the system development process and different kinds of field work related to the empirical studies of the two organizations, such as presentations, interviews, questionaries and observations.

The reason these two activities, which we label "practical" in the study, are performed in parallel, is that they support one another in a communicational and understanding regard (see discussion in section 1.2.3) and changes in one of these activities might be the cause of changes in the other activity concerning planning and their content. An example of this, is that new ideas for changes in the desired organizational decision support functions in the ODSS prototype given by the informants might be the cause of changes in the construction of that particular feature in the actual system. Both these practical subparts of the study are therefore iterative in nature.

Apart from the nine chapters that the thesis consists of, there are four appendices following after chapter 8. These are in Appendix I the questionaries used in the empircal research with the two organizations, both the versions used in Swedish and translated versions in English.

In Appendix II, a manual of the ODSS prototype is presented. This manual covers one user part and one part intended for the administrator of the system. In Appendix III, the structure of the database design is presented, and finally, in Appendix IV, the system design, a script declaration and the program code for all programs used in the ODSS prototype is presented.

2. Methodology

In this chapter, we present different possible research methods and their pros and cons. Also, possible data collection procedures identified by different researchers as well as our choice of data collection methods for this study are covered. Finally, system development methods as well as discussions regarding criticism of sources, validity and reliability regarding the chosen data collection methods and their realization are presented. This section about the theories in these areas, is followed by a discussion regarding implications of these for this study.

The purpose of this chapter is to present for the reader how we have carried out this study and why we have chosen to realize the research in this way. It is our hope, that this examination of used methods can help the reader assess our work and obtain a better understanding for the realization of the study.

2.1 Research Methods

The two main research methods, quantitative and qualitative research, and their advantages and disadvantages are presented in section 2.1.1 of this chapter. In section 2.1.2 the possibility of combining the two research methods is discussed. Finally, in section 2.1.3, our choice regarding quantitative and qualitative research methods to use in the empirical study are presented.

2.1.1 Quantitative and qualitative research methods

In general, it is possible to categorize different research method approaches into two main categories depending on how they are conducted, - quantitative research methods and qualitative research methods (Holme & Solvang 1991, Repstad 1993, Patel & Davidson 1991, etc.). According to Patel & Davidson (1991), quantitative research methods are methods for analysing numeric information in the form of statistical methods. Qualitative research methods, on the other hand, are methods used for analysing other information, such as interpretations of text.

Holter (1982), claims that the main difference between the two research methods is that quantitative research methods transform the information into numbers and amounts, whereas qualitative research methods use the researcher´s interpretation of information which cannot or should not be translated into numbers or amounts.

Due to the different characteristics of the different research methods, different methods are suited for different research purposes, kind of data involved and other circumstances. It should be noted, however, that both research methods often can be combined, supporting one another (Holme & Solvang, 1991) in research.

Table 2.1 Distinguishing characteristics of quantitative and qualitative research methods (Holme & Solvang, 1991)

Quantitative Research Methods	Qualitative Research Methods
1. Precision: The researcher strive to attain a maximal level of reflection of the quantitative variation.	1. Adaptation: The researcher strive to attain a maximal level of reflection of the qualitative variation.
2. A small amount of information about many examined objects. A "wide" analysis.	2. A large amount of information about few examined objects. A "deep" analysis.
3. Systematic and structured observations, for example, in the form of questionaries with fixed alternatives.	3. Unsystematic and unstructured observations, for example, in the form of interviews or questionaries without fixed alternatives.
4. Focus is on what is common, average or representative.	4. Focus is on what is special, unique or divergent.
5. Avoidance of the living: The collection of information is done under conditions which differ from the reality which is to be described.	5. Closeness to the living: The collection of information is done under conditions which are close to the reality which is to be described.
6. Focus is on separate variables.	6. Focus is on contexts and structures.
7. Descriptions and explanations.	7. Descriptions and understanding.
8. Viewer or manipulator: The researcher observes the phenomenon from the outside and strive to have a role as an observant. The variation of variables can be manipulated.	8. Participant or actor: The researcher observes the phenomenon from the inside. The researcher knows that his/her prescence influence the results. He or she can also take part as an actor.
9. "I-that relation" between the researcher and the informant/what is being investigated.	9. "I-you relation" between the researcher and the informant/what is being investigated.

Sometimes different aspects of the research are best studied by using a quantitative research method approach, sometimes a qualitative research method is a better alternative.

So what are the different characteristics of the respective research methods, and in what situations are they best suited? Holme & Solvang (1991), summarize the distinguishing characteristics of the two research method approaches into nine points (see table 2.1 on the previous page).

About the different distinguishing characteristics in the table, it is important to emphasize that no single characteristic in itself is more important than any other and that no single characteristic in isolation is enough as a basis from which a choice between the two research methods should be done. On the other hand, Holme & Solvang (1991) emphasize that not all of the characteristics have to be fulfilled in order to choose one of the methods in favour of the other. The table is an idealisation of the two research method extremes.

The two main research methods have different advantages and disadvantages. Qualitative methods are advantageous in that they focus on the total situation and provide a whole picture of what is being researched. This method facilitates an understanding of social perspectives and contexts. The closeness to the informants and what is being investigated that this method provides, also makes it easier to achieve deep knowledge about the individual informant´s situation or the nature of the investigated object. Therefore, this research method facilitates a deeper understanding about few examined objects or a limited number of informants. However, due to the high demand on resources this method give rise to, the method is not suited for investigations of larger populations where the objective is to find a representative sample. Rather, the objective of qualitative research methods is often to study what is *not* typical for the whole population and find divergences from trends (ibid.).

The weakness of qualitative research methods in finding representative samples is the strength of quantitative methods. By using quantitative methods, it is possible to make statistical generalizations making it possible, with an amount of certainty, to draw conclusions regarding the whole population from which the sample population is drawn. However, this advantage of quantitative research methods only apply to situations where it is easy to derive quantitative results. This is not the case in vague, subjective and social research areas where it is necessary to interpret the information being gathered into something else than numbers and amounts.

An important difference between the two research methods which imply pros and cons with the respective research method, concerns differences in the planning of the investigation. A quantitative method is in this regard characterized by

structure, where a qualitative method instead can be characterized by flexiblility. This difference between the two methods imply both advantages and disadvantages with respective method. By using a flexible qualitative approach, it is possible to gain better and better understanding of the research questions one is working with. This makes it possible to change and develop the research methods, for example the structuring of interviews, during the research.

The disadvantage, however, is that this makes it more difficult to compare information from early and late interviews, although the later interviews better can respond to the research problems. With a quantitative research approach, one tries to overcome this weakness by standardizing the planning and implementation of the research beforehand. The advantage of doing this, is of course the possibilities to generalize about the results, the drawback is that there is no guarantee that the collected information is relevant for the formulated research questions.

2.1.2 Combining quantitative and qualitative research

Since the two research methods are advantageous and disadvantageous in different areas, a third alternative can be to combine the two. This third alternative concerning research methodology, can in fact be recommendable due to the fact that quantitative and qualitative research methods used in combination can neutralize each other´s disadvantages (Holme & Solvang, 1991).

Repstad (1993) however, apart from also pointing out this mentioned advantage of this research method combination, stresses the risk of "research tiredness" of informants influenced by both methods of research. It is, according to him, reasonable to believe that informants taking part in extensive research, might get tired and loose interest in taking part.

Jick (1979), finds the following advantages of using both quantitative and qualitative research methods in combination: First, the validity (see section 2.4.2 below) obtained by using a research method is often of crucial importance. If the same result is the outcome of different procedures, this indicates that the validity of the collected information is high. Of this follows, that the results of the analysis more probably are correct. This is so, since use of different methods which result in similar results in analysis, indicates that the results are not a cause of the special research method used.

If, on the other hand, use of different procedures result in different outcomes, this might spur a development of the procedures in order to get to grips with the differences in outcomes. This might also lead to a more thorough understanding of the phenomena studied. Finally, a combination of methods can also help the

researcher finding out which method is the most effective in different situations, and these experiences can be used later in the research.

Grönmo (1982), has identified four different possible strategies using combinations of quantitative and qualitative research methods.

First, qualitative research can be used as a preparation for quantitative research. By using this strategy, the qualitative research increases understanding while preparing for the quantitative research which is the actual study.

A second approach is to use qualitative research methods in order to follow up quantitative research. According to Grönmo (1982), this can be done in two ways. First, qualitative information can be used as a supplement to the quantitative information. Second, quantitative information can be used to give an overview in order to more easily find factors to concentrate on in the qualitative research. By using the two research methods in this way, both general understanding about the research area as a whole and specific understanding regarding important issues can be achieved.

A third approach is to use qualitative and quantitative research methods in parallel, both during the collection of data and during the analysis of the information. By using this approach, both kinds of information can supplement and strengthen one another during the whole research process.

The final strategy identified by Grönmo (1982), is to collect qualitative information which is quantified during analysis. However, the author warns for use of this approach since it is very possible that too little attention is given to the qualitative data regarding demands on structure and precision needed in quantitative data analysis.

2.1.3 Research method used in this study

As mentioned in the previous chapter, the overall purpose of the empirical research is twofold, i.e. the objective is to study organizational decision making, knowledge management and means of communication in organizational decision support systems in the examined organizations in particular, as well as trying to find generalizations regarding how these issues are managed and could to be managed in other similar organizations.

This overall purpose can be regarded as dualistic and overlapping concerning choice of research method. On the one hand, a qualitative research approach is suited for the purpose of investigating the particular use of organizational decision making, knowledge management and means of communication in

ODSS in the studied organizations. This kind of study involves a "deep" analysis (a large amount of information about few examined objects) of the organizations, studying phenomena from the inside of the organizations by, to a large extent, using unsystematic and unstructured observations.

On the other hand, we are trying to find generalizations concerning how these issues are managed and could to be managed in other similar organizations. For this kind of research, quantitative research methods are better suited, focusing on common characteristics of the studied issues using systematic and structured observations with the objective of coming up with a "wide" analysis generalizable to other organizations.

Since the overall purpose of the empirical research focuses on both quantitative and qualitative aspects, we have chosen to use both qualitative and quantitative research methods in combination. However, and this is important to emphasize, since *a larger focus* of the empirical study is on what is particular in the examined organizations than on making generalizations about use and management of these issues in similar organizations, we are using a predominance of qualitative methods in the study.

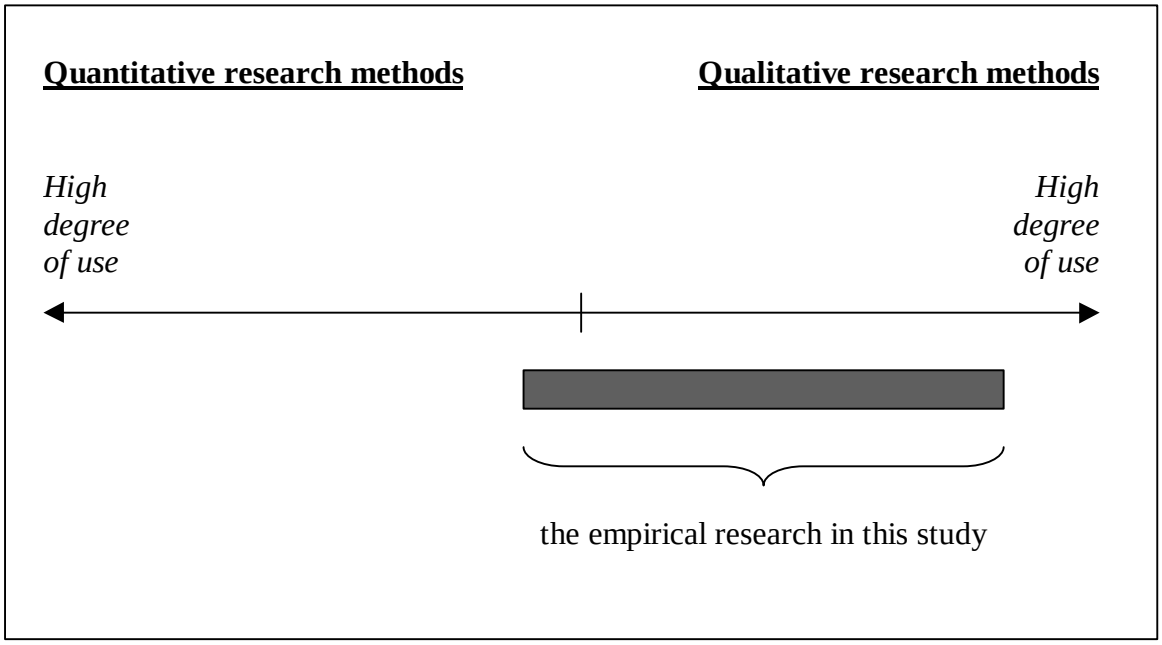


Figure 2.1 Approximation of proportion of quantitative and qualitative research methods used in this study.

The choice of this distribution of research methods is due to the fact that these research methods better respond to the purpose of the empirical research (see section 1.2.1, Purposes).

In figure 2.1, we have tried to visualize this dual use of the two research methods in this study and the proportions in use between them. As obvious, the emphasis is on qualitative research methods although quantitative approaches to some degree also have been used.

2.2 Data collection procedures

Data collection procedures identified and categorized by different researchers and their advantages and disadvantages are presented in section 2.2.1. In section 2.2.2, our choice of data collection procedures used in this study are presented.

2.2.1 Categorization of data collection procedures

Patel & Davidson (1991), describe a couple of methods by which data can be collected. Among the more thoroughly described data collection methods, are existing documents, observations, attitude forms, interviews and questionaries. Wiedersheim & Eriksson (1991), identifies two primary forms of data collection procedures in questionaries and interviews. Holme & Solvang (1991), categorize methods for data collection into observations, interviews and analysis of sources.

In the following description of different methods for data collection and their respective pros and cons, we have based our presention on the categorization used by Patel & Davidson (1991) and presented the other researchers´ theories in addition to this categorization.

Existing documents are according to the authors, such material, for example pieces of paper, which contain printed or written information. However, also more modern storage media for information such as films, photos and cassettes could be categorized as existing documents. Documents can be used to answer questions regarding such conditions which concerns actual circumstances or actual courses of events. It is also possible to use documents in order to try to answer questions regarding the experiences of individual informants.

The most critical issue when using existing documents as a data collection method regards veracity. Important questions to ask in order to be able to estimate the truthfullness of the information is when, where, why and for who the

document was created. Crucial is also what the authors call "closeness to the information giver". Here one can distinguish between primary sources of information which are information in the form of first-hand reports. All other sources of information are called secondary sources of information.

Formal definitions of primary and secondary sources of information are given by Kotler (1986). According to him, primary sources of information are information that are collected for the specific purpose at hand. Secondary sources of information refers to data that already exists somewhere and which have been collected for another purpose.

Another important issue to pay attention to when using this form of data collection method, is to make sure not only sources of information which supports the ideas in the study are presented. By only using material which supports one´s own views or results, a false picture of the researched area is presented.

Using observations as a data collection procedure is most favourable in situations where we want to study natural courses of events and behaviours, such as social behaviours, which are difficult to ask questions about or where it can be expected that the informants either cannot answer the questions or the subject is sensitive to discuss.

Observations as a form of data collection method is often used in explorative studies and as a complement to other data collection procedure forms. An advantage by using observations, is that the method is relatively independent of the willingness of informants in giving information.

There are however a couple of disadvantages associated with the method as well. Two of these concerns cost and needed time. Observations are often expensive to realize since they have to be done very close to the informants or the source of information in times when it is possible to accomplish the data collection by using observations. Also, it is important to be able to determine if the influencing conditions during the time of the observation are representative or not, something which might be very important if the purpose of the study is to make predictions or generalizations.

Holme & Solvang (1991), identifies two principal forms of observation, open observations and hidden observations. In open observations the participants know that they are observed and have accepted the observation. This is not the case in hidden observations where the informants do not know that they are observed and where the researcher does not inform the informants about his or her role as a researcher.

An advantage of open observations is that it is possible to do practical research in the form of taking notes etc. freely since the informants have accepted the role of the researcher. This is not the case in hidden observations where the researcher often must perform practical research work at other places than where the observations take place in order not to reveal his or her role in the group.

An advantage of hidden observations is that the informants, not knowing anything about the research being conducted, act naturally and spontaneously. Sometimes this is a problem in open observations where the informants, knowing that they are being observed, not act as freely, naturally and spontaneously as they otherwise would do.

A third data collection procedure identified by Patel & Davidson (1991), is attitude forms. Attitudes in a research context are, according to the authors, fundamental set of values an individual possess (ibid.).

There are several approaches available for measuring attitudes. One of these is the Likert scale which consists of a number of statements which the informants are to agree with or refrain from. A common form of Likert-scale uses the following kind of response alternatives to a statement, - agree completely, agree to some degree, indifferent, in some degree refrain from and completely refrain from.

In order not to make a Likert-scale leading the respondent answering in a particular way, half of the questions should have "agree" statements coming first, the other half should have "refrain from" statements coming first and the statements having these different order of responses should be addressed the informant at random. Of course, the questions also must be neutral in style, not leading the respondent answering in any particular way. At analysis, the answers to the statements could be quantified according to a response scale from 1 to 5, and the results could thereafter be analysed using quantitative, statistical methods.

According to Patel & Davidson (1991), interviews are personal in the sense that the researcher meet or talk to the respondent. Either directly or on the phone or by any other communication media. Questionaries, on the other hand, are mostly used in the form of forms sent by post that the respondent fills in and sends back. However, it is of course also possible to fill in questionaries during a meeting between the researcher and the informant.

In both interviews and questionaries two aspects are important to pay attention to. These are the degree of standardization and the degree of structuring. According to Patel & Davidson (1991), standardization refers to how the

questions are asked and in what sequence. Degree of structuring regards how freely the respondents should be allowed to answer the questions.

Table 2.2 Advantages and disadvantages of personal interviews, telephone interviews and questionaries (Wiedersheim & Eriksson 1991, Langlet & Wärneryd 1980)

Personal Interviews

+	Possible to use body language.	-	Costly method.
+	Controlled interview situation	-	Possiblility of "interview effect".
+	Can be used for complicated questions, especially if the respondent has got access to the questions beforehand.	-	May be difficult to adress sensitive questions.
+	Possible to use visual aids such as response cards.	-	May be difficult to have the person interviewed accepting visitors.
+	Possible to adress follow-up questions.		
+	Take short time.		

Telephone Interviews

+	Takes short time.	-	Must be questions which are quite easy to understand.
+	High response frequency	-	Not possible to use pictures or scales.
+	Low cost/interview.	-	Possiblility of "interview effect".
+	Possible to adress follow-up questions	-	May be difficult to adress sensitive questions.

Mailed questionaries

+	Can be used for questions with long answering alternatives.	-	Take long time.
+	Acceptable response frequency if used together with following up the respondents on telephone.	-	Uncontrolled measuring situation.
+	Low cost/respondent.	-	Difficult to adress adress follow-up questions.
+	No "interview effect".	-	Do not always work with open-ended questions.
+	Easy to adress sensitive questions.	-	Risk for low response frequency if used without following-up.
+	Possible to show pictures or scales.		

An unstandardized interview is an interview where the questions are formulated freely by the researcher and the questions are adressed in no particular order. In

standardized interviews, the questions are adressed in exactly the same way and order for all respondents. A structured interview is an interview which leaves very little space for the respondent to answer freely. For example, a structured interview could be in the form of "yes/no" questions where the respondent only have two alternatives.

In the same way as for interviews, standardization and structure applies to questionaries. A high degree of structured and standardized questions are useful in situations where the researcher wants to quantify the information. A low degree of structuredness and standardization is useful in qualitative approaches.

Wiedersheim & Eriksson (1991), defines an interview as a situation where a person, the interviewer, asks another person questions. According to how the interview is conducted, they categorize between personal interviews and telephone interviews. In table 2.2 below, advantages and disadvantages of these two forms of interviews as well as mailed questionaries are presented.

An important issue to consider in interview situations regards interviewer bias, sometimes also termed "interview effect". This refers to situations where the interviewer leads the respondent to answer in a certain way, by for example, adressing leading questions. In order to minimize the risk of this, it is important to pay attention to the formulation of questions, the order in which the questions are adressed and making sure that the respondent has understood the question correctly.

A special form of interview is group interviews, i.e. interviews with more than one respondent at a time. According to Repstad (1993), group interviews can be effective and time saving if the researcher wants an overview of conditions. Also, in some situations, the respondents might feel more secure being interviewed in group and be more sincere and frank towards the interviewer. In Repstad´s (1993) opinion, research on rasistic attitudes, is an exemple of an issue where this is often true.

Hoel & Hvinden (1982), mean that group interviews might provide richer information. This is so, due to a certain dynamic in these interviews where something said by one respondent can be followed-up by a comment from another respondent which makes a third respondent change his or her opinion regarding an issue. One of the most interesting advantages of group interviews is this dynamic in the discussions, where the subject is discussed among the different respondents and different views and opinions are presented and questioned.

A disadvantage with group interviews might be that only opinions acceptable within the group are discussed (Repstad, 1993). In some groups certain opinions

are taboo and group members having different opinions do not articulate them. Due to this, it is very important for the researcher to try to identify the degree of "openness" in groups as well as, when it seems necessary, complement group interviews with individual interviews or other data collection forms.

2.2.2 Choice of data collection procedures

For our purposes, we have used a combination of many different data collection procedures. The motives for using many different data collection methods in combination are many. However, an overall motive for chosing different methods for collecting information has been the fact that the different purposes of the study call for different research approaches and therefore, different data collection procedures.

As for the first purpose of the thesis regarding studies of theories in the areas of knowledge management, organizational decision support and means of communication in organizational decision support systems, we have collected information using existing documents in the form of published written academic material in the different theretical research areas we have examined. The reason for chosing this kind of data collection method is obvious, - there is a lot of theoretical research published dealing with these issues which is easy to get across, and it would be very difficult to, for example, arrange interviews with the leading academic researchers in these areas.

As for the purpose of the empirical study, the second purpose of the study described in section 1.2.1, qualitative as well as quantitative information needs are present due to the dualistic research aspects of the empirical study mentioned above. In order to satisfy these qualitative and quantitative information needs, different data collection methods, suitable for the two different research methods respectively have been used.

Apart from this, we have tried to adapt the data collection methods in the empirical study to the specific possibilities and preferences of the informants in the two organizations studied and use different data collection methods depending on the particular organizations´ preferences and other organization-specific circumstances. Hence, as many as four different data collection approaches have been chosen. These are studies of existing documents, presentations in the form of group interviews, individual interviews and questionaries.

Existing documents, for example organization charts and other written material obtained from the two organizations examined, have been used in order to better being able to understand the organizational and hierarchical context in which

decisions are made in the organizations and how this might influence the decision making as well as internal conditions for knowledge management. The studies of existing documents have helped us in gaining knowledge about these issues in the two organizations and have helped us in the communication with the informants during interviews and group interviews. For this purpose, the studies of these existing documents have been done mainly during the initial phases of data collection in the organizations and before other data collection methods have been used.

Presentations of the web-based organizational decision support system prototype we have constructed as one of the purposes of the study, have been conducted in the form of group interviews with informants from two different decisive bodies from one of the two examined organizations.

In these group interviews, the discussions have centered on the theoretical issues which are dealt with in the study and these discussions to a large degree have been based on the presentation of the system and the preferred capabilities such a system ought to have in the informants´ own organization. The presentation of the system therefore have been used as a departure from which the discussions have continued and as a means of communication regarding decision making issues, knowledge management and means of communications in organizational decision support situations.

The motive behind using this form of group interviews has been the possibility to have discussions with whole groups of decision makers in an organization simultaneously. In this way, our understanding of the decision making and knowledge management used in the organization has increased and concepts regarding these issues, and the different conceptions of the decision making in itself between the different informants, have been clarified and specified.

The group interviews has been an important data collection method especially regarding the more subtle, organization-wide issues in the empirical study concerning, for example, how an issue progresses from being just an issue to be something which is decided upon in the organization or how knowledge is actually managed in the organization.

Individual interviews have been conducted with key persons in the decision making process, knowledge management process etc. in the organizations and these interviews have been used mainly as a complement to the group interviews and/or questionaries. The focus of these individual interviews have been on the individual perspectives on knowledge management and decision making of the respective informant, expressing how he or she experiences the collective decision making.

Questionaries are a fourth data collection method used in the empirical study. The focus of these, have been on qualitative issues by using questions of an open-ended character. However, some of information gained from the questions have been analyzed in a more structured manner in order to make it possible to quantify the answers in a certain degree during the analysis. Therefore, the questionaries provide qualitative as well as quantitative information in this context although there is a larger focus on qualitative aspects.

2.3 System Development Methods

Two main categories of system development methods, the “waterfall“ method, and prototyping as well as their advantages and disadvantages are presented in section 2.3.1 and 2.3.2 of this chapter. In section 2.3.3, our choice regarding system development methods for use in the development of our ODSS prototype are presented. This choice of methodology concerns purpose 3 of the study, to construct a small, web-based organizational decision support system prototype. Since section 2.3.3 deals with our choice of methodology for purpose 3 and a motivation of that choice, this section can be viewed as a continuation of section 2.2.2 above, where a discussion regarding methodology referring to purposes one and two are presented.

2.3.1 The "waterfall" method

The waterfall method is one of the most common system development methods used. The methodology is compared to a waterfall because it consists of several stages which follow each other in succession like a waterfall. Every stage in the model is initiated after the preceding stage is achieved. This means that every stage depends on the results of the previous stage and there is no turning back once a stage is completed (Sommerville, 1996). Since the model works in this one-way manner, the stages are said to "flow down" from one stage to another (see figure 2.2 on the next page).

Due to the fact that the waterfall method implies a system development process which is one-way and go from stage to stage without going back to a previous stage, it is best suited for well-defined and well-structured tasks where a thorough understanding of the problem can be obtained already at the beginning of the system development process. However, this kind of problem understanding cannot always be obtained at the beginning of the process and a disadvantage of this approach is therefore that it does not facilitate changes, additions and refinements to the system specification during later stages in the system development process.

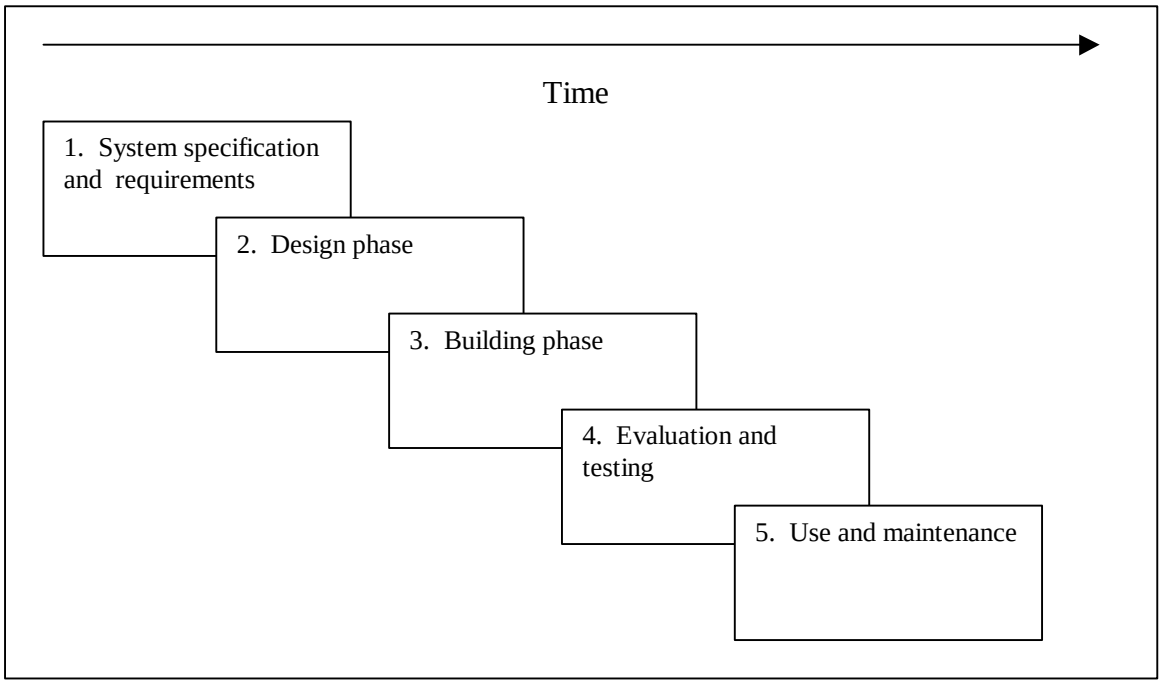


Figure 2.2 The waterfall model

2.3.2 Prototyping

According to Lantz (1986), prototyping can be considered as a collection of methods, which are accomplished in a systematic manner and where a model of the desired system is constructed. In prototyping, system development takes place in small steps, and tests and feedback provide refinements between these steps. Often a small feature is tested, first in isolation, then in relation to other features and finally as a fully functional part of a larger system. Therefore, prototyping is a process that begins with an idea or an apprehended need, and ends with a finished product which is ready to be used (Lundequist, 1995).

According to Gibson & Hughes (1994), prototyping can be viewed as a system development method that supports an integration of the physical system design and the conceptual system design. By using prototyping, ideas that come up late in the system development process after the initial stages can still be explored and also be evaluated as a project evolve.

According to Sommerville (1996), there are two main forms of prototyping, - evolutionary and rapid prototyping, which are similar in that they both enable an an explorative system development process where ideas can evolve during time, but are different regarding their focus on the requirements in the system specification.

Prototyping, which according to Sommerville (1996), is evolutionary is based on the idea of that an initial, incomplete, prototype should be implemented. Thereafter the prototype should be exposed to critical review, and this review should lead to refinings of the initial prototype and many improved versions should be constructed until the desired system has been developed. Evolutionary prototyping focuses on the well-understood requirements of a systems specification and proceeds from these to the unclear requirements.

Rapid prototyping, on the other hand, focuses on the unclear requirements in the specification. When using this technique, new designs are developed and evaluated quickly, and those designs that do not seem appropriate are discarded immediately after each prototype design phase. This "throwing away" of prototypes after design phase makes this kind of prototyping sometimes referred to as “throw-away” prototyping (Sommerville, 1996).

2.3.3 Choice of system development method

The third purpose of the study, to build a functional, small, web-based organizational decision support system prototype with capabilities corresponding in some degree to the theoretical areas of purpose 1, differs in methodology from the other two purposes. This purpose is more technical, does not involve data collection in the same manner as the other two purposes and can best be characterized as a system development process where inputs and comments about the features and functions of the system continously have been provided through the other two purposes of the study.

The system development process of the web-based system, has been conducted using prototyping. Since the construction of the system has taken place in parallel with the other parts of the study and since the design of functions in the prototype has been influenced by this work, we have found prototyping as a method in this case superior to the waterfall modell.

The prototyping has been evolutionary in some respects as well as rapid in other. Evolutionary in the sense that the different modules the system prototype consists of, have been constructed by using incomplete, small prototypes which have been developed first in isolation, then in connection with the other modules in the system.

Rapid in the sense that new modules sometimes have been constructed and tested, but then been rejected and dropped from the system completely. Ideas for new modules and developments of existing modules sometimes have originated in the discussions with the informants of the two organizations taking

part in the empirical research and sometimes these discussions have also resulted in rejections of almost finished modules.

2.4 Criticism of sources, Validity and Reliability

In the following sections, 2.4.1 to 2.4.3, criticism of sources, validity and reliability of this study is discussed. Also, theoretical backgrounds to the concepts of validity and reliability are presented. Due to the small extent of these theoretical backgrounds to the concepts presented, these are given in the same sections as the discussions about these issues as they apply in this study.

2.4.1 Criticism of sources

Criticism of sources can be regarded as a method of selection where collected material in the form of information and data are reviewed and criticized.

In this study, we have used litterature and research results from well-known authors in respective research area. To some extent, the literature examined have been chosen after having consulted with our supervisor, Faramarz Agahi. In other cases, we have either borrowed litterature at libraries, used the online search engines of literature databases provided by Göteborg University, or borrowed or received written material from the two organizations investigated.

As for Internet sources other than the online search engines of literature databases provided by Göteborg University, we have tried to use only written material which has been used in a research context by well-known academic writers to as large an extent as possible. All Internet sources are dated in the list of references with the date when they were found by us for use in the study in order to determine when they existed last.

2.4.2 Validity

According to Rosengren (1992), the concept of validity can be defined by saying that a valid measurement measures what it is supposed to measure. Merriam (1994), distinguishes between internal validity and external validity. According to him, internal validity refers to the level the results of the study corresponds to reality. Do the results really capture what there is?

External validity refers, according to Merriam (1994), to the extent which the results from a certain investigation is applicable to situations other than the investigated, i.e. the degree of generalization that can be achieved.

We have tried to increase the validity of this study by chosing different approaches regarding data collection in the empirical study and having as many informants as possible involved in the empirical studies of the two empirically investigated organizations. These informants have been chosen according to role in the respective organizations and we have tried to use informants with experiences from many different areas of the organizations relevant for the study.

Also, we have chosen different purposes in this work where the individual purposes supports the other purposes chosen. An example of this support, is the facilitation of communication with the informants in the empirical study achieved by constructing a webb-based ODSS prototype ourselves. As for the existing literature, we have used only sources we have considered relevant and accurate, written by well-known researchers in the respective theoretical area of the study. Our judgement is therefore, that the sources of information chosen are valid for the result of this study.

Regarding internal and external validity, we consider the study more internally than externally valid. This is due to the concentration on organization-specific research using mostly qualitative research methods instead of industry-specific research using a majority of quantitative research methods.

2.4.3 Reliability

Reliability refers, according to Merriam (1994), to the extent by which the results of a study can be repeated. According to Rosengren (1992), reliability means that a measurement instrument, for example in the form of a questionary, should get stable and reliable results. If the study is conducted once again, will it give the same results another time? However, since reality constantly changes, especially human nature, the concept of reliability is problematic in social research. In the natural sciences, on the other hand, the finding of, for example, casual relations between variables, in general generate a higher degree of reliability (ibid).

Since this study is about social phenomena such as knowledge and decision making the level of reliability in this study can be considered as low in comparison to, for example, studies conducted in the natural sciences.

However, reliability is a wide concept which can be studied at different levels of abstraction and with different points of departure. Lincoln & Guba (1985), mean that the term reliability in a traditional meaning is very inappropriate in qualitative

research. Instead they suggest the use of the terms "level of dependence" and "context" regarding the results obtained from the information in a study.

Wiedersheim & Eriksson (1991), refers to reliability as the ability of a measurement to resist the influence of chance. According to Rosengren (1992), errors in measurment which have their origin in chance, can be referred to four different sources, - the measurement instrument such as the formulation and order of questions, the interviewer or author of questionaries who can influence the result, the environment during measurement e.g. interruptions, and the measured object e.g. tired or unwilling informants.

In order to avoid the influence of chance in our research, we have used several interviewers at as many interview occassion as possible, with many of us researchers simultaneously taking notes. By using this procedure, we have reduced the risk of the interviewer misunderstanding the answers of the respondent and drawing the wrong conclusions from answers from the respondent since we have been able to compare our notes afterwards.

Also, we have prepared the individual and group interview sessions thoroughly and tested the questions on each other and consulted with our supervisor before we have used the questions in the interviews and in questionaries. As for the presentations used in the empirical study, we also arranged an initial presentation with two researchers at the Institution for Informatics in order to test our ideas and get feedback on the presentation before we conducted the presentations with the informants in the empirical study.

In order to have the respondents as well-prepared as possible for the interviews, we have in some cases sent out the questions for the interview in advance and/or presented the webb-based organizational decision support system prototype we have constructed, which we to some extent have based the discussions with the informants on, before the actual interview occassions. In this way we have been able to answer questions about the ODSS prototype in advance and clarify functions or questions well before the actual interviews.

By using these procedures during the accomplishment of the study, we think we have been able to resist the influence of chance to a high extent in the study. Viewed in this perspective, the level of reliability in this study can be considered as high.

3. Definitions of central concepts

In the following, some definitions of concepts central to the study of organizational decision support are presented. The purpose of this background, is to introduce concepts related to the main research areas of this thesis. Hopefully, this presentation can give the reader a more thorough understanding of subjects dealt with in later chapters in the theoretical frame of reference.

3.1 MSS, DSS and ODSS

Since many of the terms related to MSS, DSS and ODSS are defined very differently among different authors, we have found it important to define and clarify their different meaning and our interpretations of the concepts before we later use these terms in our own study.

First, in section 3.1.1 - 3.1.3, some definitions of the general terms, management support systems (MSS), decision support systems (DSS) and organizational decision support systems (ODSS) are discussed and presented. In section 3.1.4, a discussion of the presented definitions and a choice of definitions used in this study are presented. In section 3.1.5 concepts related to one of the three main research areas of this thesis, - knowledge management are presented. Apart from the concept of knowledge management, we here discuss some other terms closely related to this buzzword, such as knowledge, organizational memory and organizational learning. We have chosen to present definitions of all these concepts in one section since they are closely related. In section 3.1.6, the concept of group decision support systems (GDSS) is presented. Finally, in section 3.1.7, a discussion of the presented definitions and our choice of definitions regarding these concepts is given.

3.1.1 Management support systems (MSS)

According to Turban & Aronson (1998), management support systems (MSS) can be defined as ”collections of computerized technologies used to support managerial work and decision making” (p. 1), or ”the application of any decision support technology to decision making” (p. 863).

The term sometimes is given an even wider definition. For example Dutta, Wierenga & Dalebout (1997) refers to MSS as ”The appropriate design of computer-based systems for supporting managers” (p. 70).

3.1.2 Decision support systems (DSS)

According to Turban & Aronson (1998), the term decision support systems (DSS) refers to a more narrow concept than MSS. In fact, DSS is only one of many distinct management support system technologies. Other examples of such technologies are expert systems (ES) and group support systems (GSS) including group DSS (GDSS). The definition of the term DSS given by these authors is twofold depending on the context in which it is used.

On the one hand, these researchers point out that the term can be used as an ”umbrella term to describe any and every computerized system used to support decision making in an organization” (p. 14). Also, the term can be defined more narrow. In this respect the authors define a DSS as a flexible, interactive, and adaptable computer-based information system (CBIS) specially developed for supporting the solution of a nonstructured management problem for improved decision making.

The term DSS is defined very differently by different authors, and there is a large disagreement about what is really meant by the term. Bonczek et al. (1980) relate DSS to ES technologies to support knowledge, and their definition of the term involves three interacting components: a language system which provides communication between DSS components and the user, a problem-processing system which contains problem-manipulation capabilities and a knowledge system which is used for storing problem domain knowledge embodied in a DSS. This knowledge can be stored either as data or as procedures.

Keen (1980), on the other hand, views DSS in connection with system evolution through the development process and the usability of systems. Keen defines decision support systems as a developmental process where the user, the builder of the DSS and the DSS in itself all are capable of influencing one another which results in system evolution and new patterns of use.

Sprague (1980), defines DSS as computer-based systems that help decision makers solve unstructured problems through direct interaction with analytical models and data.

A problem with the different interpretations of the term DSS, is that it is very difficult to use the term. Each definition focuses on different isolated aspects of decision making, and according to Turban & Aronson (1998), many definitions of DSS are too narrowly focused and ignore the central theme and purpose of the concept, namely to support and improve decision making. Due to this, Turban & Aronson (1998) have provided what they call an "ideal set" of 13 standard characteristics and capabilities of DSS (see figure 3.1).

These standard characteristics and capabilities are:

1. The kind of problems DSS provide support for, are mainly *semistructured and unstructured problems*. The problems are solved by combining computerized information and human judgement.

2. A DSS gives support for managers at *various managerial levels* in organizations.

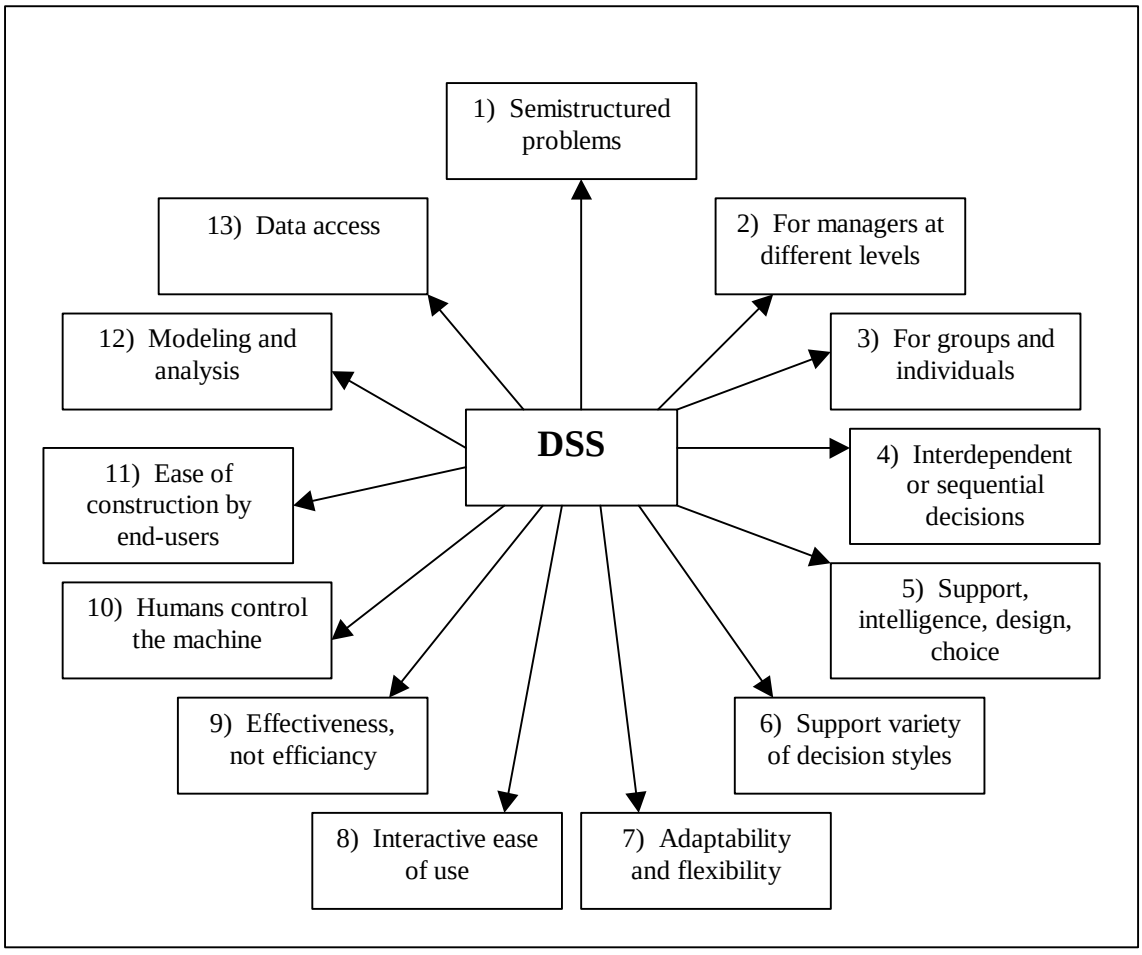


Figure 3.1 The Ideal Characteristics and Capabilities of DSS (Turban & Figure Aronson, 1998)

3. The support given by a DSS can be given to *individuals* as well as to *groups of users*.

4. A DSS can provide support to many *interdependent and/or sequential decisions*.

5. *All phases of the decision-making process are supported* by a DSS. These phases are intelligence, design, choice and implementation.

6. A DSS supports *different decision-making styles and processes*.

7. A DSS is *flexible and adapts over time*. Flexible, in that users can add, delete and in other ways change the basic elements that constitutes the DSS. Adaptive, in that the decision maker quickly can adjust the DSS to meet changes in the environment and new conditions.

8. A DSS should be *user-friendly* and adapted towards computer unexperienced decision makers.

9. The purpose of using a DSS is to *improve the effectiveness* of decision making, e.g. timeliness and quality, rather than improving the efficiency (cost) of decision making.

10. As the term indicates, a decision support system attempts to *support* decision makers, not replace them.

11. Related to number 8 above, a DSS should be *easy to configure* and flexible in use. It should be *easy to modify* the DSS in order to pay regard to different needs of different decision makers.

12. DSS often use *modelling for analyzing decision-making* situations and problems that call for decisions. These modelling capabilitites provides possibilities of experimenting with different strategies of action under different circumstances and configurations.

13. Access should be provided to *many kinds of data sources*, such as formats, types, etc.

A DSS is according to Turban & Aronson (1998) composed of 5 distinct subsystems (see figure 3.2). These are a data management subsystem, a model management subsystem, a knowledge management subsystem, a user interface subsystem and the user (who is considered a part of the system).

The first subsystem in the figure, data management, relates to the database containing data in the system. This database is managed by a database management system (DBMS). In the model management subsystem, quantitative models are provided which give the DSS analytical capabilities. Included in this subsystem are software to update, combine, etc. the model base which is used in the DSS. This software is sometimes referred to as a model base management system (MBMS).

The knowledge management component is a subsystem which takes care of collecting, disseminating and categorizing knowledge in the system. This subsystem can act in the DSS either as an independent component or as a supporting component for the other subsystems. The role of the user interface, is

to handle communication with the user and forward inputs from the user to the other subsystems.

Finally, the manager (user) is considered a part of the DSS. This is so, since some researchers assert that unique contributions to the way a DSS functions as a whole actually comes from the user himself due to intensive interaction with the computer.

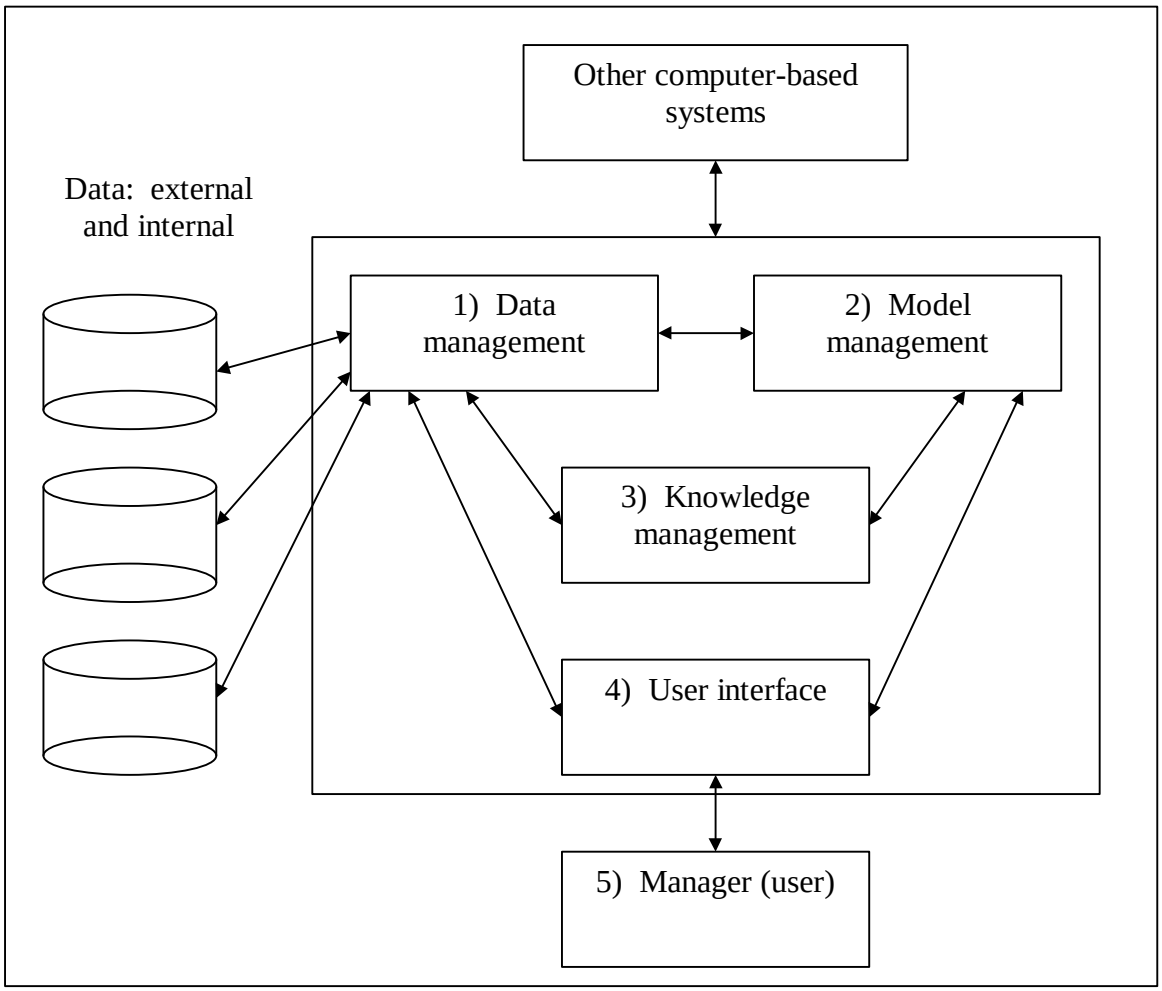


Figure 3.2 The five DSS Subsystems (Turban & Aronson, 1998)

3.1.3 Organizational decision support systems (ODSS)

A development of the term decision support systems (DSS) is provided in the term organizational decision support systems (ODSS). The latter was first introduced by Hackathorn & Keen (1981). They distinguished among three types of decision support depending on the number of people who were involved in the

decision making. On basis of this categorization, decision support can be individual, group and organizational decision support.

As in the case of DSS, many authors have given different definitions of ODSS. Kivijarvi & Kuula (1996) gives the following definition: "An Organizational Decision Support System (ODSS), is a general-purpose, multiple-user, large-scale system, which is designed for a variety of organizational decisions and has a relatively definite, continuous and organized position in the planning and decision making processes of a company."

Watson (1990), refers to the term as a combination of computer and communication technology, which is designed to coordinate and disseminate decision making in organizations so that decisions can be congruent with organizational goals and managers´ shared view of the competitive environment the organization exists in.

According to King & Star (1990), the concept of ODSS is an application of technologies of computers and communications which purpose is to enhance the organizational decision-making process. According to them, ODSS provides the same kind of technical support for decisions for a group of decision makers as group decision support systems do.

As was obvious in the case of definitions of DSS, many authors stress different aspects of terms. The same is true regarding organizational decision making when defining the term ODSS. George (1991/1992) have found some common characteristics in definitions of ODSS: First, an ODSS is focused on organizational activities and decisions where many different organizational problems and/or units are affected. Second, an ODSS not only affects many different organizational problems and/or units, it also cuts across different functional and hierarchical layers in an organization. Finally, an ODSS very often incorporates different kinds of communication- and/or computer-based technologies.

So what architectural differences are there really between an organizational decision support system and an ordinary DSS? According to Carter et al. (1992) two clear structural differences can be noticed (compare figure 3.2 *The five DSS Subsystems* with figure 3.3 *Subsystems in an organizational decision support system*).

First, one of the subsystems making up an ODSS is a case management component. In the same way as DBMSs and MBMSs are used to manage large databases and model bases, case management systems (CMS) are used in an ODSS in order to manage the large number of similar runs, i.e. runs with imputs which differ only slightly from one run to the next, which occur in an ODSS.

Second, an ODSS differs from an ordinary DSS in that it is accessible by several users at the same time, accessing the system from different locations. A DSS does not necessarily have this ability, and there is no support for management of large numbers of similar runs as there is in an ODSS.

The CMS has three main functions to perform (ibid.): First, it takes care of recordkeeping of the model cases (specific runs). Second, it documents changes from one run to another. Finally, it facilitates and supports output comparison.

Apart from the two clear structural differences between an ODSS and a DSS, - the case management component and multiuser access, an intelligent component of some form is also often added to an ODSS.

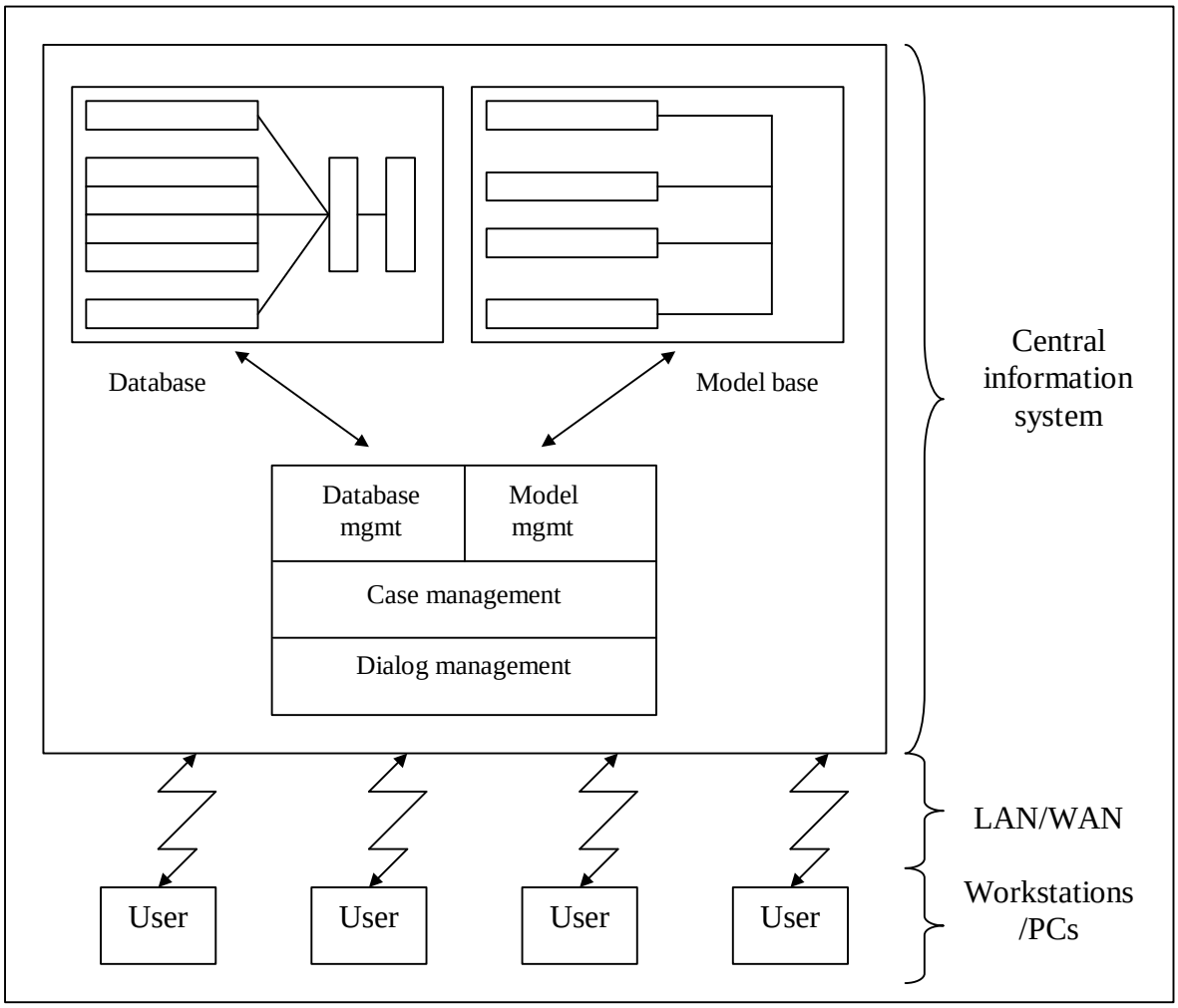


Figure 3.3 Subsystems in an organizational decision support system (Turban & Aronson, 1998)

The availability of this kind of intelligence is also noted by Carter et al. as something which often makes an ODSS differ from a conventional decision support system.

Like Carter et al.(1992), Walker (1989) has identified differences between organizational decision support systems and conventional DSS. Walker has found differences between the two forms of decision support which he has categorized into five different categories. These are purpose, policies, construction, focus and support.

As for purpose, Walker argues that an organizational decision support system is intended to improve the efficiency and effectiveness of a larger number of decision makers than conventional DSS do. Furthermore, the system is usually sold to an organization and not to an individual as conventional DSS often are.

Regarding construction, this process can be regarded as a significant undertaking under an ODSS and therefore needs a more structured approach. This is not the case in many forms of DSS where the construction process is very informal.

The focus of the different kinds of decision support also differs. The focus of an ODSS is directed towards functions which are to be performed, not on individual users which is often the case in conventional DSS. Finally, the decision support delivered by an ODSS cut across functional, hierarchical and geographical bounderies which is often not the case in a regular DSS.

3.1.4 Discussion and choice of definitions

As obvious from the above discussion on definitions of the terms MSS, DSS and ODSS there are many different aspects of the concepts which can be emphasized and sometimes the different terms actually overlap depending on how the concepts are defined. An example of the latter, are the two definitions of DSS, where the broad definition given by Turban & Aronson (1998) in fact would categorize every system with the purpose to facilitate decision making as a DSS.

In our view, the three concepts and their internal relationships could be viewed in the following way (see figure 3.4 *Relationships between the concepts MSS, DSS and ODSS*):

MSS could be defined in accordance with one of the definitions of Turban & Aronson (1998) as ”the application of any decision support technology to decision making” (p. 863). This is an overarching, general term, which applies to

all kinds of systems aimed at supporting the decision making of managers in organizations.

In order to produce clarity and not risk an overlapping of concepts, a narrow definition of DSS is required. Turban´ & Aronson´s (1998) narrow definition of DSS as a flexible, interactive, and adaptable computer-based information system (CBIS) specially developed for supporting the solution of a nonstructured management problem for improved decision making, could be used for this purpose. However, in order to distinguish the term from the related term ODSS, it would be of value to add information about the number of decision makers involved, to make the term useful. This is also something which is stressed by many other reserchers as distinguishing between the two forms of decision support systems. Therefore we add this to Turban´ & Aronson´s (1998) definition.

Regarding the chosen definition of ODSS, we have based it on the definition of DSS and contrasted the number of decision makers involved with the definition of a conventional DSS. Also, we have added the fact that organizational decision support systems, according to both Walker (1989) and George (1991/1992), often deals with problems cutting across different functional, hierarchical and geographical layers in organizations, as well as taken account of the larger possibility of finding some sort of intelligent component supporting decision making in this kind of decision support systems.

Our chosen definitions of the three terms are therefore as follows:

Management support systems (MSS) is the application of any decision support technology to decision making.

Decision support systems (DSS) are flexible, interactive, and adaptable computer-based information systems (CBIS) specially developed for supporting the solution of nonstructured management problems for improved decision making for a limited number of decision makers.

Organizational Decision support systems (ODSS) are flexible, interactive, and adaptable computer-based information systems (CBIS) specially developed for supporting the solution of nonstructured management problems for improved decision making for a larger number of decision makers. The problems often cuts across different functional, hierarchical and geographical layers in the organization and the systems often make use of an intelligent component.

In figure 3.4 below, we have tried to visualize the relationships between the defined concepts. Decision support systems and organizational decision support systems are both being considered as kinds of management support systems

which is the general, overarching term for this kind of systems. DSS and ODSS differs in relation to each other mainly regarding number of decision makers involved, the kind of problems involved and the probability of artificial intelligence involved.

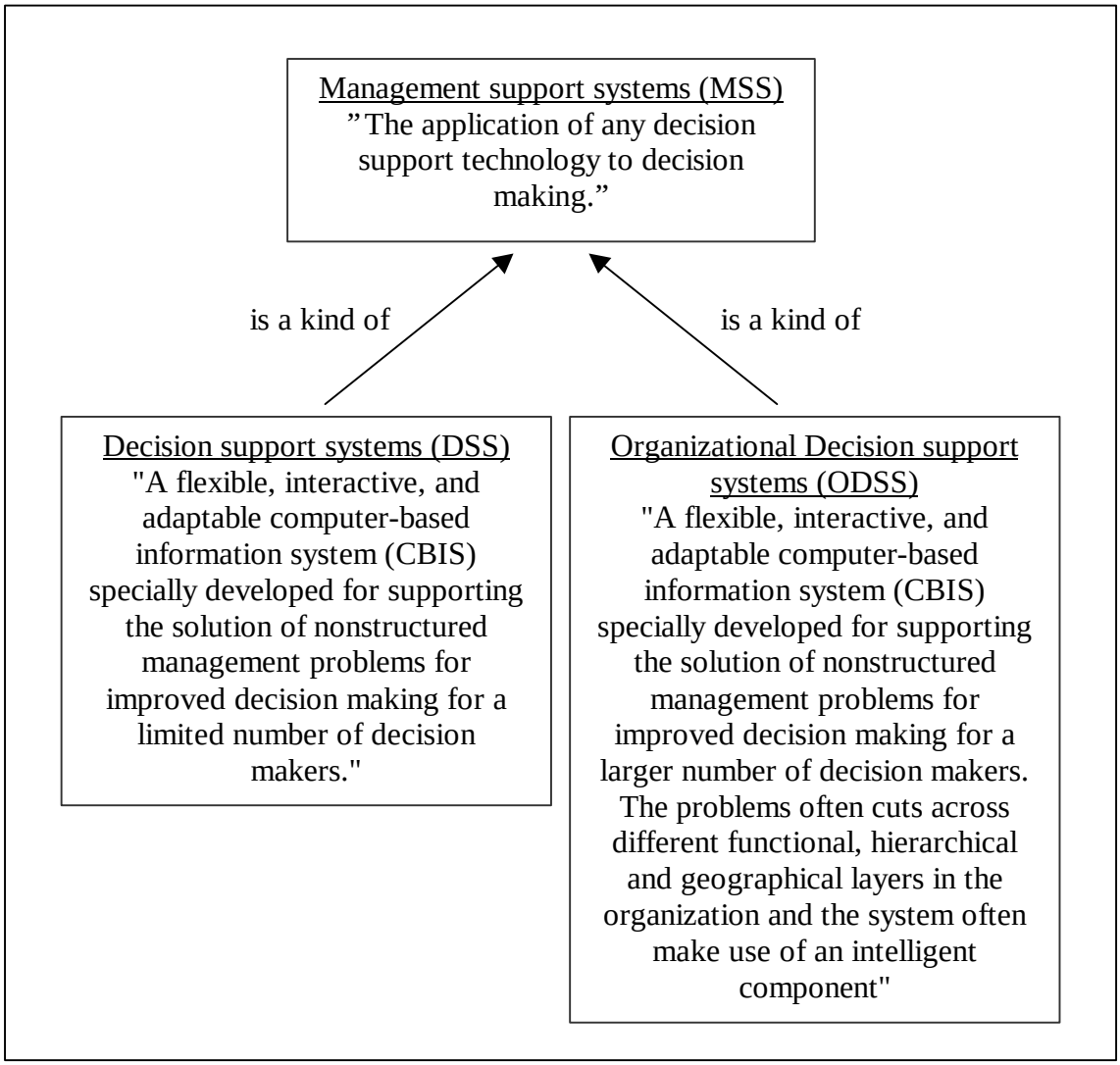


figure 3.4 Relationships between the concepts MSS, DSS and ODSS

3.1.5 Knowledge management

Although it can be considered difficult to find clear definitions of MSS, DSS and ODSS, the matter is even more complicated as for definitions of knowledge management. The problem originates from the fact that even the meaning of the two words making up the term knowledge management, are subject to

disagreement. This is not the case regarding, for example, the word "decision" in the term decision support system. Most researchers agree more or less upon what is meant by that term, although of later years, some researchers have begun to question the meaning of that word also (e.g. Minzberg et al., 1995).

It is beyond the scope of this study to separately explore the concepts of "knowledge" and "management" in too much detail, - there is a whole theory of knowledge called epistemology represented in philosophy, so especially that area is subject to a lot of research in itself. However, a few definitions of the term "knowledge" will be presented before we move on to the definitions of the compound term "knowledge management".

Handschuh et al. (1998, p.1) focus on knowledge as processed information. They define knowledge as "the internal state of an agent following acquisition and processing of information. An agent can be a human being, storing and processing information in his mind, or an abstract machine, including devices to store and process information".

Pukzsta (1999, p. 32), on the other hand, claims that what qualifies as knowledge in one context is barely even information in another. Of this follows that, according to her, "the only sound distinction between knowledge and information is that knowledge has an inseparable component: cognition."

Due to the problem of having different definitions of knowledge, it is more difficult to assess definitions of the compound term knowledge management, since it is not certain that the different researchers have the same understanding of what the term knowledge by itself means. Many definitions of the compound term is not preceded by a definition of what knowledge is, - maybe this is because the word "knowledge" exists in our daily language and is often thought of as "generally understood". Sometimes, however, an implicit definition of knowledge is included in the larger definition of knowledge management.

Regarding the problems in finding a homogeneous definition of the term, Poynder (1998, p. 20) has categorized three different "schools" of knowledge management, each with their own interpretation of what the term refers to. "For some it is primarily an IT issue, with a growth in networks and groupware seen as driving new collaborative working practices. Others maintain that it is essentially a human resource issue, with a new emphasis on teamwork sparking a culture of information sharing. A third school insists that it is primarily about creating new processes to measure and capture a company's 'know how' so as to maximize efficiency and effectiveness". Having said this, a few defintions of knowledge management are as follows:

Malhotra (1998), defines the concept as a reaction towards change in an organization´s external environment. According to him the term could be defined according to the following: "Knowledge Management caters to the critical issues of organizational adaption, survival and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings".

Newman (1991), gives a shorter definition which stresses the management part of the term, in that it focuses on a collection of processes, which after transformation in the organization becomes knowledge. His definition is as follows: "Knowledge Management is the collection of processes that govern the creation, dissemination, and utilization of knowledge".

Related to the concept of knowledge management are the concepts of knowledge creation and organizational learning. The two terms are often used referring to the same thing, namely the ability of an individual or organization to learn which is achieved by the creation of knowledge.

There are many definitions of organizational learning and organizational knowledge creation. According to Argyris (1993), organizational learning can be viewed as a process of detecting and correcting errors. In Argyris view, organizations learn through the individuals in the organization which act as agents for them: "The individuals' learning activities, in turn, are facilitated or inhibited by an ecological system of factors that may be called an organizational learning system" (p. 117).

Huber (1991) gives another definition which states that in an organization, learning occurs through the processing of information where the range of its potential behaviors is altered. According to him, learning does not need be conscious or intentional. Also, learning does not always increase the effectiveness of the learner, neither potential effectiveness. Moreover, according to Huber (1991) learning need not result in observable changes in behavior.

According to Nonaka (1994), knowledge is created and organized through a flow of information. However, the information is only a necessary medium through which the knowledge can be formalised and created.

Goodman (1998), presents a view of the concept which is more complex then the other two presented. According to him, organizational learning can be regarded as the process by which one unit in an organization acquires knowledge from another unit in the same organization.

Goodman (1998), distinguishes organizational learning from individual learning by stating that Individual level learning happens when solutions from one organizational unit are matched to problems of an individual from another unit in an exchange of a problem solution.

Organizational-level learning, on the other hand, occurs when "the problem solution exchanges and consequences are communicated and known by other organizational members, there is some form of organizational memory that stores problem-solution exchanges and consequences, and there is a mechanism for organizations to share their interpretations about the problem solution exchanges and to update the organizational memory about their experiences" (ibid.).

Organizational memory is another term related to the concept of knowledge management. Here, the issue regards the "saving" of knowledge in an organization for future use in the form of an organizational-wide memory.

According to Hackbarth & Grover (1999), the term can be defined as "all the data or information that describes knowledge and can be used to generate new knowledge". An alternative definition of organizational memory is given by Stein (1992) who define the term as "the means by which knowledge from the past is brought to bear on present activities, thus resulting in higher or lower levels of organizational effectiveness". Finally, Day (1994) defines the term as "a repository for collective insights contained within policies, procedures, routines, and rules that can be retrieved when needed".

3.1.6 Group decision support systems (GDSS)

Regarding group support systems (GSS), or group decision support systems (GDSS), as they also are called, these consist of technology that supports activities carried out by decision makers in a group.

According to Turban & Aronson (1998), the group of decision makers in general are assisted by a leader who plan meetings, coordinates the activities of the team, etc. as well as a facilitator whose responsibilities embrace promotion of use of problem-solving techniques and encouragement of concensus building. This kind of system often supports idea generation, problem analysis etc., and thereby facilitates decision making in a group and can improve the quality of decisions by reducing the risk of "groupthink" (see section 4.2.2) by, for example, provide possibilities to anonymize opinions.

DeSanctis and Gallupe (1987), has defined a GDSS as an interactive computerized system with the purpose of facilitating decision making regarding unstructured problems by a group of decision makers. Apart from the definition of

the term, DeSanctis and Gallupe (1987) have categorized group decision support systems into three levels, each with a higher level of intervention on the group exchange and with an increasing degree of technological sophistication.

Systems categorized as belonging to the first level, "provide technical features aimed at removing common communication barriers, such as large screens for instantaneous display of ideas, voting solicitation and compilation, anonymous input of ideas and preferences, and electronic message exchange between members" (p. 590).

Systems on the next level of sophistication "provide decision modeling and group decision techniques aimed at reducing uncertainty and 'noise' that occur in the group's decision process" (p. 590). An example of a common technique used on this level is Delphi methods (see section 4.4.3). Finally, systems on the third, most advanced level are "characterized by machine-induced group communication patterns and can include expert advice in the selecting and arranging of rules to be applied during a meeting" (p. 590).

Another definition of the term group decision support systems is given by Vogel & Nunamaker (1990). According to them, group decision support systems use technology to support problem solving in group decision situations, which improve decision performance and effectiveness of the group.

Huber (1984, p.196) gives the following definition. "A Group Decision Support System (GDSS) is a computer based information system that enhances group decision making by facilitating the exchange and use of information by group members, and interactions between the group and the computer, to formulate and solve unstructured problems".

As in the case of DSS earlier, Turban & Aronson (1998) have found a couple of standard characteristics and capabilities of GDSS.

These standard characteristics and capabilities are:

1. A GDSS is *not just a configuration* of an already existing system, it is a specially designed system.

2. The goal of a GDSS is to *support groups of decision makers* in their work. More specifically, group decision support systems should improve the decision making process or the outcomes of groups

3. In resemblance to ordinary DSS, a GDSS should be *easy to use* and not only be for computer skilled users.

4. The design of a GDSS can be directed towards only *one type of problem* or towards a *variety of problem types* which are subject to decision making.

5. A GDSS should be designed so that it *encourages conflict resolution*, *freedom of expression* and *idea generation*.

6. A GDSS should provide mechanisms that *discourage the negative groupthink*, *miscommunication* and *destructive conflicts*.

3.1.7 Discussion of presented definitions and choice of definitions

As mentioned, definitions in the research areas covered by this thesis are often many and ambigous in nature. Definitions of knowledge management are perhaps the worst concept in this regard, - the interpretations of this buzz-word of todays business are so many and divided that it is almost impossible to find an interpretation and definition of the concept which can be said to be complete and unambigious.

Regarding the definitions of the knowledge management concept given above, we have found the definition used by Malhotra (1998) as the most useful and understandable due to the fact that the definition implicitly defines what the knowledge-part of the definition consist of. This is not the case in, for example, Newman´s (1991) definition.

Goodman´s (1998) definition of organizational learning is long, but has an important advantage in that it contrasts organizational learning with individual learning and clearly defines the requirements for organizational learning as opposed to learning for individuals. In this thesis the terms organizational learning and organizational knowledge creation which is a term used by, for example Nonaka (1994) will be used meaning the same thing.

As for a definition of organizational memory, we find Day´s (1994) definition useful. Since some authors (e.g. Moorman & Miner, 1997) concludes that the memory of an organization not necessarily must encompass all organizational members, "collective insights" which is used in the definition, in our opinion, are useful words to describe the nature of the knowledge contained in an organizational memory.

Regarding the definitions of group decision support systems (GDSS), we have found Huber´s (1984, p.196) definition of the term clear and useful. Huber stresses interaction between the system and the decision makers and exchange of data and information between the group members. This view of the purpose of a GDSS fits well together with other interpretations and definitions of related terms and concepts, such as DSS and ODSS, and distinguishes a GDSS as a decision support system intended for a group of decision makers, i.e. more than

one individual decision maker (see figure 3.5 *Relationships between the concepts MSS, DSS, ODSS and GDSS*).

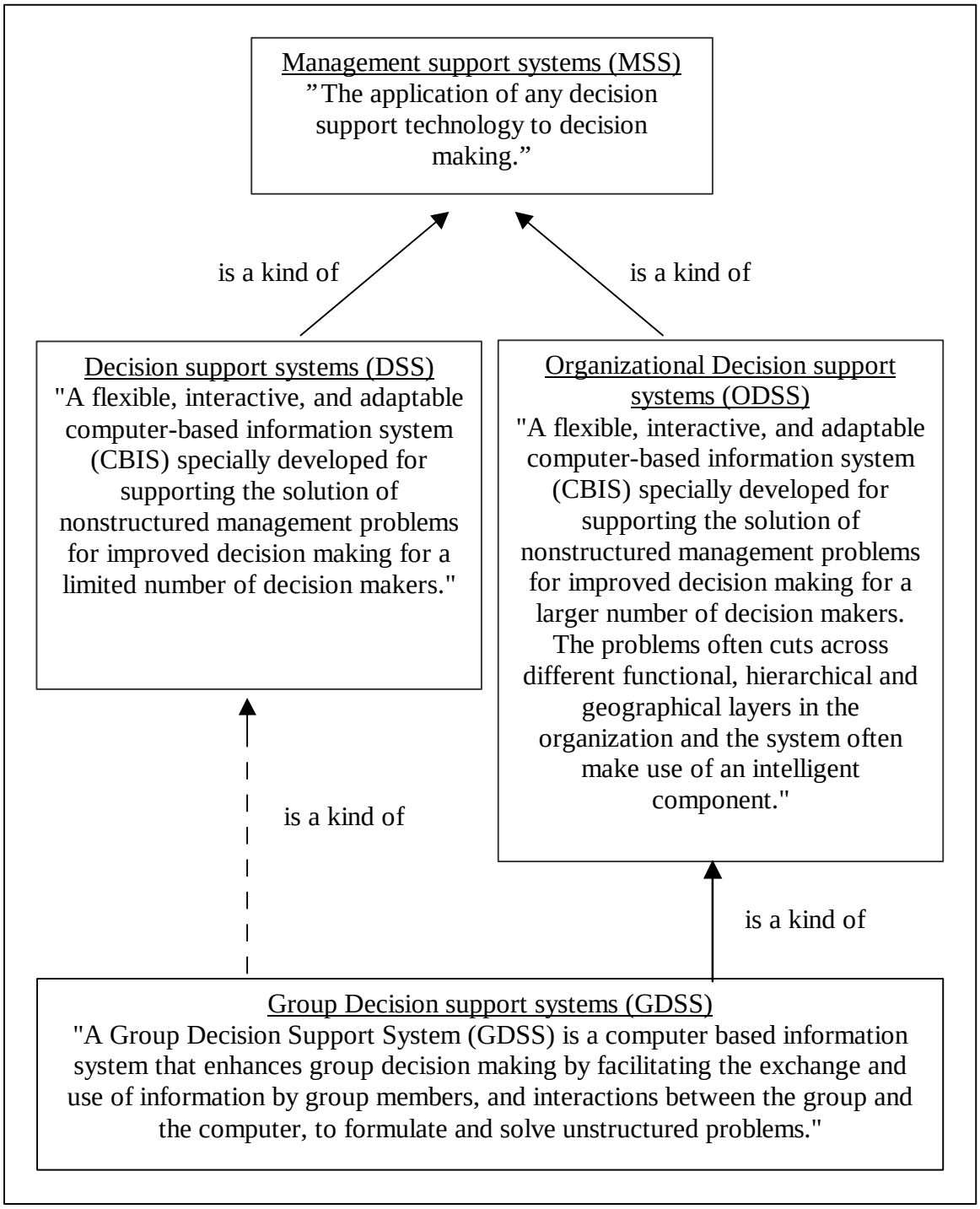


Figure 3.5 Relationships between the concepts MSS, DSS, ODSS and GDSS

Not any one of the definitions of GDSS mention anything about the size of the group of decision makers. However, since the use of a GDSS never is intended for a single individual decision maker, which a conventional DSS can be (cf. the definitions and capabilities of a DSS above given by Turban & Aronson, 1998, and Hackathorn & Keen, 1981), one can draw the conclusion that a GDSS is more related to the concept of ODSS than DSS. This stronger relation to ODSS is reflected in figure 3.5 with a dotted arrow between GDSS and ODSS and a normal arrow between GDSS and DSS.

Our chosen defintions of knowledge management and group decision support systems are as follows:

Knowledge Management caters to the critical issues of organizational adaption, survival and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings (Malhotra, 1998).

A Group Decision Support System (GDSS) is a computer based information system that enhances group decision making by facilitating the exchange and use of information by group members, and interactions between the group and the computer, to formulate and solve unstructured problems (Huber, 1994).

4. Theoretical Frame of Reference: Group and Organizational Decision Making Support

In this chapter, which is the first chapter in the theoretical frame of reference consisting of a total of three chapters, theories regarding group and organizational decision making and support are presented and discussed. This chapter correspond to purpose one, - To examine theories on organizational decision making and organizational decision support systems.

In the chapter, we present different research findings, first regarding the concept of decision making, then regarding decisions made by groups of decision makers and finally, regarding group decision support systems. The focus of the chapter, as indicated by the chapter name, is on the latter two. However, in order to better being able to discuss these two issues, a discussion regarding decision making in general, is first presented.

The purpose of this chapter is to give a summary of important research findings regarding decision making and decision support and thereby fulfil the first purpose of this study. The chapter can also be viewed as a theoretical background in order to better understand the system development process described in chapter 7 and the empirical research described in chapter 8.

4.1 Decision Making

A short introduction to the decision concept is given in section 4.1.1 of this chapter where the classical decision making process described by Simon (1960) is described. This section is followed by section 4.1.2 where the view of the decision making process represented by some other researchers in the area are presented. Finally, in section 4.1.3., the concept of rationality, which is the basis for the decision making process as described by Simon (1960) and which most other research about decision making refer to, is described.

4.1.1 The decision making process by Simon

One of the most influencing works concerning the decision making process which is used as a point of departure in many researchers´ work regarding decision making (see, for example, Gray 1994, Kersten & Szpakowicz 1994, 1997, Sprague & Carlson 1982, Sprague & Watson 1993, Stanek, S. A. B. 1997), is the decision making model by Simon (1960). In his famous book entitled *The New Science of Management Decisions*, Simon (1960) distinguishes three major

decision making phases termed intelligence, design and choice respectively. A fourth phase called implementation later was added to the model. The model has been used as a point of departure in research about individual decision making as well as decision making in an organizational context.

During the intelligence phase, the environment is investigated and problem areas as well as opportunities are identified. This phase is often triggered by dissatisfaction with problems and the objective of working better towards organizational goals.

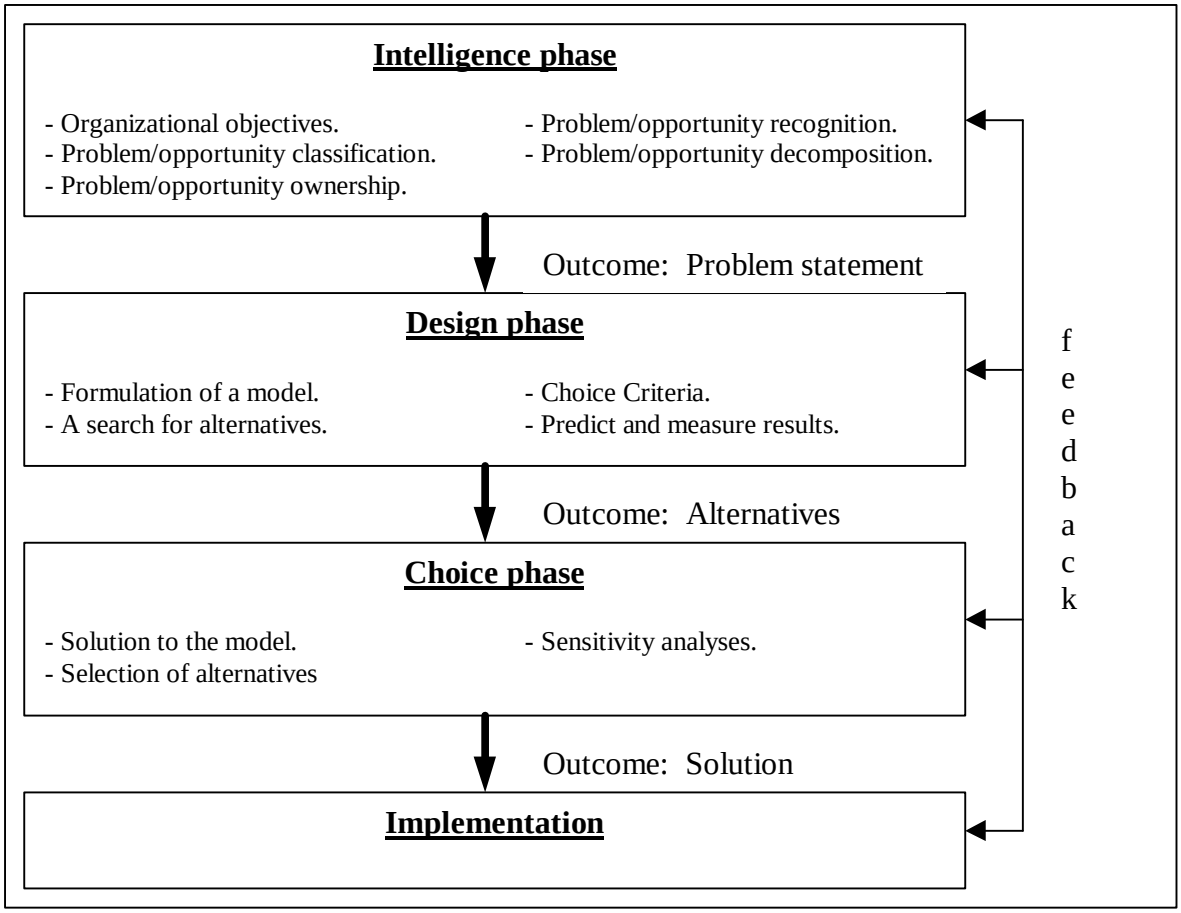


Figure 4.1 Simon´s model over the decision making process

Apart from finding opportunities and problems, the intelligence phase also involves classification of the opportunity or problem one might need to decide on for example, concerning the level of structuredness involved in the issue.

Regarding structuredness, Simon (1960) distinguishes between two extreme forms, programmed problems which are simple, repetitive problems which can be

solved using standard, structured solutions, and nonprogrammed problems which are complex and unstructured in nature.

Sometimes it is possible to decomposite complex problems into smaller subproblems. The smaller subproblems sometimes are easier to find solutions for and the level of structuredness can in some cases increase if a large, complex problem is decomposed into smaller parts which are solved in isolation.

Apart from this decomposition which is sometimes done during the intelligence phase, an establishment of ownership must be done during this phase, i.e the actual possibilities of being able to solve the problem within the organization as such must be investigated. Sometimes a problem identified in an organization cannot possibly be solved simply by using the resources of the organization. At these times the organization does not have problem ownership and can therefore not solve the problem by itself.

The problem statement is the product of the intelligence phase. The problem statement marks the start of the design phase and represents the understanding of the problem situation about which actions are to be taken. Sometimes later in the decision making process, the involved decision maker/makers realize that the problem statement is incorrect. Then the intelligence phase must be redone in order to achieve a better understanding about the problem situation. This iterative character of the process is present in all stages of the decision making process (see figure 4.1 above).

In the design phase different possible courses of action are analyzed. A model of the problem situation is constructed which conceptualizes the problem and its abstractions into quantitative and/or qualitative forms. When it is necessary, assumptions and simplifications are made in order to make the problem more easy to understand and reason about. When making these assumptions and simplifications, there is a trade off between representation of reality and ease of solution. If the problem is simplified to a large degree, it is easier to find solutions, but the simplification is less representative of the reality it is used to describe.

As a part of the model building, different alternatives are generated. These alternatives are then evaluated by predicting the outcomes of each alternative. Depending on how much the decision maker/makers know about the possible results of the alternatives, the decision making is said to be done under different levels of certainty, where the probabilities of the different outcomes are evaluated unless the decision maker/makers have complete certainty about the probabilities of the different alternatives.

The next phase in Simon´s (1960) model of the decision making process, the choice phase, refers to the finding of a solution to the model constructed in the

previous phase. The choice phase includes a search for an appropriate course of action that will solve the problem identified in the intelligence phase. This search is followed by an evaluation of the alternatives regarding how well these correspond to the goals of the organization. On basis of this evalutation, an appropriate solution to the model is recommended.

The final phase in Simon´s (1960) model of the decision making process, regards implementation of the solution chosen during the choice phase. What then does this actually mean? According to Turban & Aronsson (1998), implementation can be defined as "putting a recommended solution to work" (p. 59), i.e. practically carry out the solution to the problem in reality.

4.1.2 The decision making process by other researchers

Like the decision making process model advocated by Simon (1960), there are many other models which suggest phases or steps through which decision makers procede when they make decisions, which represent patterns of behavior that seem to occur regularly during the process of decision making. However, according to Witte (1972), who has empirically investigated purchase decisions, very few decisions actually correspond to a standard, structured sequential process where the decision making evolve through distinct phases.

Garvin (1998), categorize studies on decision making as belonging to two major categories. According to him, one group of researchers have focused on the structure of decision making processes and, like Simon, have divided the decision making process into stages or phases following one another in sequence.

Another group of researchers has used a more focused approach, studying a certain kind of decision making in organizations associated with certain management roles and responsibilities in the decision making. According to Garvin (1998), the research of this second group of researchers has led to two important insights.

First, this research has made researchers in the area of decision making acknowledging the simultaneous, multilevel character of decision making processes. Although sequential stages or phases often can be specified in these processes, they cannot simply be viewed as such in order to achieve a complete understanding of the decision making process. These studies must also be supplemented by detailed studies of the interaction of subactivities across different levels in organizations and through time.

The second insight distinguished by Garvin (1998), regards how this research has focused attention on the role of the individual managers in decision making. Factors such as the goals of the organization, values, and reward systems shape and influence decision processes, making these processes far more complex then just a simple sequence of phases.

Sabherwal & King (1995), are two other researchers who have categorized research concerning the decision making process. As Garvin (1998), they have identified two major approaches which have been used in studies of decision making processes.

The first of these follow in the footsteps of Simon, and conceptualizes decision making into a couple of sequential phases. Examples of academic work which can be categorized as belonging to this approach are, according to Sabherwal & King (1995), the research by Minzberg et al. (1976), Nutt (1984) and Shrivastava & Grant (1985).

The second approach identified by Sabherwal & King (1995), concerning the study of the decision making process, focuses on key attributes of the overall decision-making process and not on separate phases in the process. According to Sabherwal & King (1995), examples of research which can be categorized as belonging to this second approach are, Hickson et al. (1986), Miller (1987) and Stein (1981).

4.1.3 The concept of rationality

According to Lutz & Lux (1988), rationality in a decision making context refers to "the logical application of means to attain particular ends" (p. 91). In accordance to this view of rationality, the "rational economic man" chooses the alternative that maximizes the desired value regarding, most often, utility or profit (Tomer, 1992). Underlying this theory about economic rationality, is the assumption that all relevant information can be reduced to a value which can be measured and that there are no qualitative considerations which must be done which cannot accurately be reduced to a quantitative value.

What is sometimes called subjective expected utility (SEU) theory, is a theory about how the rational economic man makes decisions. According to Simon (1955), this refers to selecting the alternative with the maximum expected return while at the same time taking knowledge of the outcomes of the alternatives, the probabilities of these outcomes and the utility or value placed on these outcomes into account. The problem is, however, the fact that in natural, real-world situations, decision makers cannot apply the SEU model.

According to Simon (1955), the reason for this "is that human beings have neither the facts nor the consistent structure of values nor the reasoning power at their disposal that would be required, even in these relatively simple situations, to apply SEU principles" (Simon, 1983, p. 17). Due to this constraint of human beings, decision makers, according to Simon, have bounded rationality.

Tomer (1992), identifies many reasons why SEU theory does not work in real-world decision situations where decisions are to be taken regarding complex, unstructured issues. For example, decision makers can very seldom generate all relevant alternatives from which to choose and most people, unless trained in statistics, do not understand the concept of probabilities thoroughly and therefore cannot assess probabilities correctly.

4.2 Group Decision Making

Group decision making or organizational decision making can be defined as decision making where more than one decision maker is involved in making the decision. Group decision making differs from decision making involving only one decision maker since bargaining about the decision has to take place between the decision makers unless they are of exactly the same opinions regarding the issue to decide upon.

According to Simon (1957), the influence of an organizational context is very important in this context. "Organization refers to the complex pattern of communications and other relations in a group of human beings. This pattern provides to each member of the group much of the information, assumptions, goals, and attitudes and enter into his decisions, and provides him also with a set of stable and comprehensible expectations as to what the other members of the group are doing and how they will react to what he says and does."

According to Beach (1997), it is fundamental for the understanding of organizational and group decision making, to first understand how an organizational environment forms the construction of socially shared interpretations of events. According to him, this means that in an organization, there is a common core of understanding shared by the members of the organization which allows them to work together and communicate about occuring events and shared goals. In fact, it is this shared understanding which builds up the organization. Without it, there would not be an organization in any real sense.

This shared understanding in the group or organization is never perfect. Nobody knows all that is to be known of an issue or problem and different members of the

organization or group know different things about the problem or issue. Of this follows that the individuals in the organization all conceive problems/issues in the organization differently and therefore have different frames of references regarding issues concerning the organization or group.

Apart from this complicating factor when decisions are to be made by groups instead of by individual decision makers, coalitions between the participants as well as politics and the different formal and real power between the decision makers make group- and organizational decision making even more difficult to analyse. Also, when dealing with complex issues in larger organizations, the decision makers often are representatives of a larger interest group in the organization which might complicate the making of decisions even more.

In section 4.2.1, potential pros and cons of group work as identified by Turban & Aronson (1998) are presented. This section is followed by a more detailed presentation of a couple of well-known dysfunctions related to group work in section 4.2.2 - 4.2.4. These dysfunctions are groupthink, game theory and risky shifts. In section 4.2.5, the "garbage can" model by Cohen et al. (1972), is described. This model, as well as the decision making process according to Simon (1960) are then contrasted to the model for organizational decision making proposed by Langley et al. (1995), which is given in section 4.2.6 of this chapter.

4.2.1 Potential advantages and disadvantages of group work

Turban & Aronson (1998), refers to groups as "two or more (usually up to 25) people whose mission is to perform some task and who act as one unit" (p. 350). They have summarized potential benefits and dysfunctions of such group work into a couple of distinctive points (see table 4.1 below for a summary of most of these points).

In our view, benefit number two in the table, "People are accountable for decisions in which they participate" is doubtful. In comparison with decisions made individually, is this really a benefit in groups of decision makers? For us, the answer is no, since individual decision makers cannot blame others for decisions they have made themselves. As soon as there are more than one decision maker involved in making a decision, the possibility of blaming others afterwards arises. Especially, in case a decision which later prove to be a bad one, was taken by a majority vote, it is indeed very possible that a decision maker involved in the decision but voting against it, will try to hold him- or herself not responsible for the taken decision. At least, this behaviour can often be identified in politics.

On the dysfunctions side of the table, we miss a point which could be stated as follows: "Individual decision makers sometimes tend to maximize their individual benefit of a group decision at the expense of what would be best for the decision group". This is related to what is usually called game theory, something which is covered in the next section of this chapter.

4.2.2 Groupthink

In his famous book from 1972 and renewed edition released ten years later, - " Victims of Groupthink: A psychological study of foreign-policy decisions and fiascoes", Janis (1972) studied the impact of group psychology in foreign-policy decision making. According to him, the condition of groupthink can be defined as "a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action" (Janis, 1982, p.9).

What then is the cause of groupthink in organizations? Janis (1972) attributes the emergence of this phenomenon to the following factors which all are manifestations of the fact that groups characterized by groupthink cannot be expected to respond rationally to their environment:

In groups of people there sometimes might develop norms that, on the one hand, enhance the morale of the group, but on the other hand, negatively affect critical thinking. Group members who disagree with the general views of the group and abandon from the group consensus are likely to be subjected to powerful social pressures to conform to the general views of the group once again. Also, members of the group sometimes share an "illusion of invulnerability," which leads them to ignore clear warnings of danger in the environment or to become overly optimistic and willing to take too high risks.

Since groups characterized by groupthink, have internalized the norms of the group, the group members in such groups subconsciously might suppress their own critical thoughts and ignore the moral consequences of group actions and actually regard the morality of their group as sound.

Finally, members in groups characterized by groupthink sometimes can make decisions on the basis of incomplete or incorrect information. This is so, since some members in the group may take the role of, what Janis calls, "mindguards," suppressing information that would damage the relations between the group members or the confidence in the group as a whole.

Table 4.1 Potential benefits and dysfunctions of group work (Turban & Aronson, 1998)

Potential benefits	Potential dysfunctions
1. Groups are in general better at understanding problems than individuals are.	1. Groupthink (see section 4.2.2) in which people in the group tend to think alike and supress new ideas.
2. People are accountable for decisions in which they participate.	2. Group decision making is in general a slow and time-consuming process, where only one individual decision maker at a time can can speak.
3. Groups are better than individuals in finding errors.	3. More difficult to coordinate the work done by a group than work done by an individual.
4. A group has more information (knowledge) than any one member in the group and can combine that knowledge and create new knowledge. This results in more alternatives generated and better solutions.	4. Inappropriate influnces regarding, for example, domination of time, topic or opinion by one or a few individual decision makers in the group.
5. Synergy effects during problem solving may be produced.	5. Tendency of group members to rely on others regarding distribution of work related to the decision.
6. Working in group might stimulate the participants in the group and the process.	6. Tendency towards compromised solutions of poor quality.
7. Group members will have their egos embedded in the decision and hence they will be commited to the solution.	7. Risk for incomplete task analysis, nonproductive time consisting of, for example, waiting for people to arrive, socializing.
8. Risk propensity is balanced since groups tend to moderate high-risk takers and on the same time encourage conservatives.	8. Large costs of making decisions. For example in the form of travel expenses and hours of participation.
	9. Tendency of groups to make riskier decisions than they should (see section 4.2.2).

There have been many theoretical and empirical studies with the purpose of testing the hypothesis of certain underlying conditions leading to groupthink (e.g. McCauley 1989, Park 1990 and Hart 1991).

Many studies take political incidents as their point of departure. Janis's own descriptions are mainly of political fiascoes, for example, the invasion of the Bay of Pigs, Pearl Harbor and the Vietnam war. According to Janis, an expected consequence of groupthink is a lower probability of a successful outcome regarding the work produced by the group.

McCauley (1989), also has based his studies on political events. According to him, structural conditions such as group insulation, group homogeneity and promotional leadership, sometimes tend to result in poor decision making.

The most influencing conditions in order for groupthink to appear seem, according to Park (1990), to be a state of high group cohesion and/or an apprehended external or internal threat to the group. However, not all researchers agree upon the first of the conditions identified by Park (1990), regarding the influence of a state of high group cohesion as a basis of groupthink. According to Callaway & Esser (1984) for example, signs of groupthink in cohesive groups often are few if effective procedures for decision making are present.

4.2.3 Game theory

Traditionally, so called game theory, has "been developed as a theory of strategic interaction among players who [act] perfectly rational, and who (consequently) exhibit equilibrium behavior" (Erev & Roth, 1998, p. 848). Although these theories acknowledge the social environment in which decision making takes place, it regards the individual decision makers as thoroughly rational beings, strictly concerned with their own self-interest, whose only motive in the decision making is personal payoff. This total focus on the payoffs is however influenced by judgments about what the other decision makers might do (Luce & Raiffa, 1957).

Given these assumptions, it is possible to "play games" and find value maximizing alternatives for the different players in the game. It is of course questionable to which extent such games can be played in a group decision making context due to the many other factors influencing group decision making and the bounded rationality characterizing human beings, but although it is easy to claim that it cannot be an explanation for all group decision making behaviour, these theories cannot be completely neglected as an explanation for, e.g. the behaviour of individual decision makers in specific decision situations.

4.2.4 Risky shifts

"Risky shift" is a term used by social psychologists to describe "the observed tendency of people in groups to select a choice that is riskier than the average of their individual risk preferences when they are asked to reach a consensus on an acceptable risk level" (Belovicz et al., 1971, p. 81).

There have been many explanations for this phenomenon, but regarding group decision making the important implication worth noting is that decisions riskier than those preferred by any of the individual decision makers, and riskier than those a hypothetical individual rational decision maker would make, may be produced (ibid.).

4.2.5 The "garbage can" model by Cohen et al.

Although many researchers in the area of decision making have followed and built on the findings of Simon (1960), there have been opposing views as to the relevancy of his model. One of the most recognized and extreme of these opposing views has been the so called "garbage can" model by Cohen et al. (1972). Other researchers representing this view of the decision making process are, for example, Pinfield (1986) and March (1978).

According to Cohen et al. (1972), decision situations, especially when the uncertainty regarding goal and technology are high, are built up of relatively independent streams of participants, problems, solutions, and choices. Decisions are realized through chance and timing, at times when participants, problems, solutions, and choices happen to coincide and when solutions are attached to problems and problems to choices by participants in the decision making process who have the time, willingness and energy to do so.

In the "garbage can" of Cohen et al. (1972), unused and/or partially used ideas in the organizations pile up until someone finds the ideas useful. According to the garbage can view, decision processes are characterized by disorderliness and attention from the decision makers could be given to any decision depending both on the attributes of that decision, the competition for attention, and even on the arrival time of the information (Bruns Jr & McKinnon, 1993).

4.2.6 The model for organizational decision making proposed by Langley et al.

In an article proposing a new model for the decision making process, Langley et al. (1995), begin by categorizing previous work in the research area into three distinct categories, - organizational decision making as sequential, anarchical and interactive.

Langley et al. (1995), label the view on the decision making process as represented by Cohen et al. (1972) as anarchical, due to the view on the decision processes as very unstructered and complex in this category. The traditional views on the decision making process as identified by, for example, Simon (1960) and Nutt (1984) are labeled sequential, on basis of the view of the decision making as a sequence of events, driven by diagnosis.

Apart from the metaphor of a garbage can for the decision making process as used by Cohen et al. (1972), Langley et al. (1995), see the use of a vortex as used by Hickson et al. (1986) as a more representative, milder metaphor for the anarchical theories (see figure 4.2).

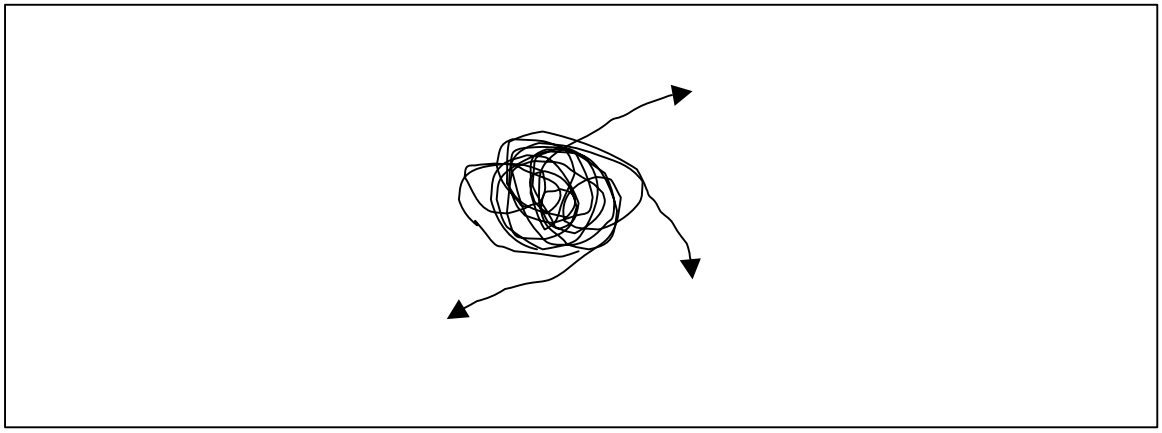


Figure 4.2 Organizational decision making in the form of a vortex as anarchical, driven by events

According to Langley et al. (1995), many different researchers have positioned their work in between the model proposed by Cohen et al. (1972) and, as they see it, the other extreme in the form of Simon´s (1960) model of the decision making process. Models between these two extreme models are, according to them, characterized by iterative sequence (see figure 4.3 on the next page).

Models in this category, combines sequential and anarchical parts by imposing a series of dynamic factors, such as organizational politics and internal/external

interruptions, on a sequential model. According to Langley et al. (1995), an example of such a model, which combine both sequential and anarchical views, can be found in the works by Mintzberg et al. (1976).

According to Langley et al. (1995), the isolation of the decision making moment into a final choice as well as the view of the decision making process as decomposable parts are artificial constructs which do not correspond to reality. Three important limitations with traditional conceptions of decision making, are according to them, reification, dehumanization and isolation.

The first limitation, labeled reification, that these authors identify, is the view that a decision exists and it is possible to clearly identify this decision. There is a moment of choice, when the decision makers actually make the decision. According to Langley et al. (1995), this is not necessarily true. In their view, a decision is a construct, which on the one hand can be useful, but on the other hand, the use of which reflects a fundamental view of an organization as mechanistic or bureaucratic.

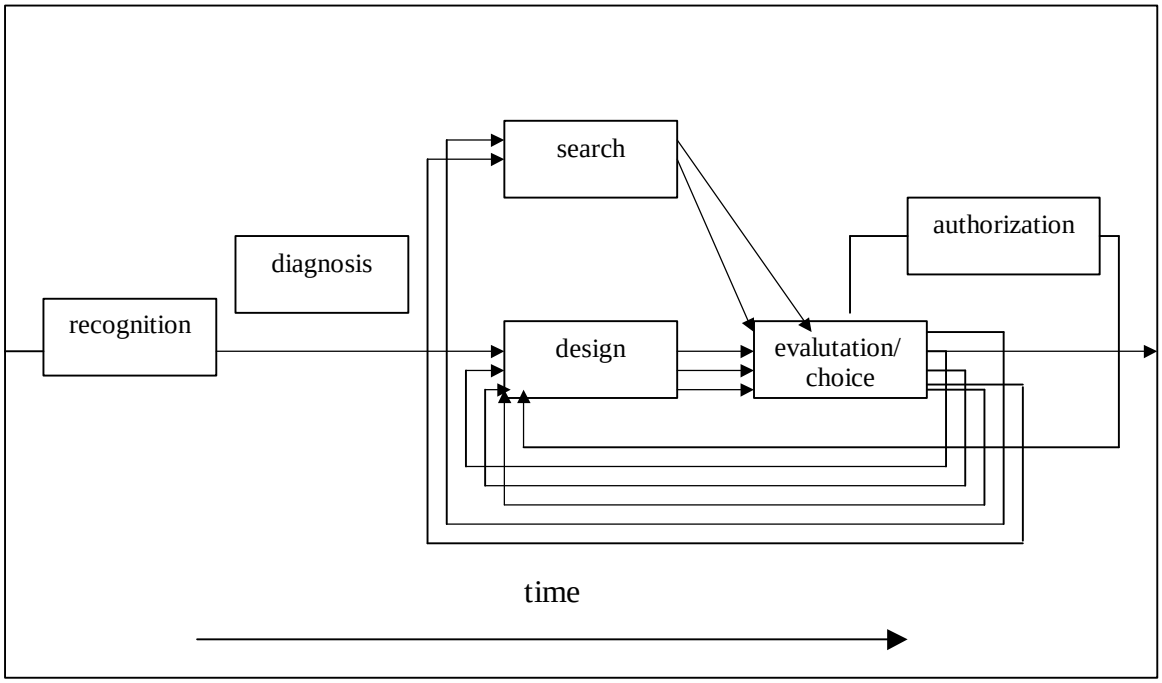


Figure 4.3 Organizational decision making as an iterative sequence driven by diagnosis and interrupted by events (modified from Langley et al., 1995)

The second limitatation regards the view that decisions evolve in a sequential pattern, where no regard is paid to emotions and imagination of individuals as well as individual differences. Hence, arational forces are neglected in almost all

traditional research work on decision making. Due to this, Langley et al. (1995), stresses the role of the individual decision maker who, in their view, have a central role in the decision making process as a creator, actor and carrier in that process and that forces such as insight, inspiration and affect, on individuals can have important effects for how the decision makers make decisions in an organizational context.

Isolation is the term used by Langley et al. (1995), for the third kind of limitation they find in earlier research. This concerns the assumption that the processes that underlie a decision actually can be isolated from each other and from much of the collective reality experienced in the organization. That is, there is a belief in traditional research on decision making that distinct, individual processes can be viewed and identified in isolation, tracing back from identified choices in the organization, and that these processes can be described in isolation from the organizational context in which they exist. According to Langley et al. (1995), it is in fact very common that decision processes instead are characterized by linkages and interrelations with each other.

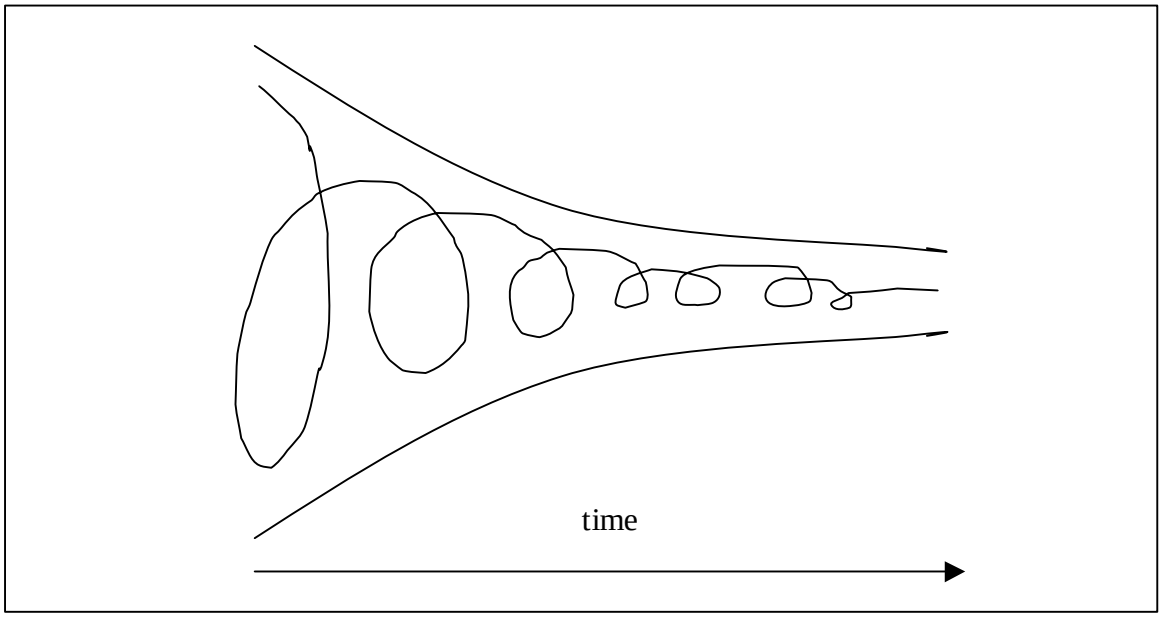


Figure 4.4 Organizational decision making as convergence (modified from Langley et al., 1995)

In order to overcome the three limitations of traditional research mentioned, Langley et al. (1995), have constructed three models which, according to them, take account of these limitations.

The first of these (see figure 4.4), views organizational decision making as a convergent process where decision making follows a gradual convergence over time which is driven by iteration.

In this view, a decision cannot be viewed as simply *a* decision appearing at *a* specific point in time. Rather it can be regarded as "the construction of an issue" where the decision makers, instead of working backwards from the image of the final solution to a problem, instead work forward continously forming the decision. In this way, since the process is driven by iteration and no longer by diagnosis, diagnosis ceases to be recognized as a phase in the decision making process at all.

As mentioned, Langley et al. (1995), regards the individual decision maker as having a central role in the decision making process as a creator, actor and carrier in that process.

Regarding the decision maker as a creator, the authors would like to contribute with an "insightful man" instead of the "administrative man" as proposed by Simon (1960). This insightful man listens to his or her subcontiousness and uses this in order to achieve creative insight and thinking as well as restructured reasoning. This insight which sometimes is achieved among decision makers is important according to the authors, since a large part of the behaviour of the organization is dependent on this and since these insights together contribute to change the world we live in.

When discussing the decision maker as an actor, this discussion by Langley et al. (1995), originates in the traditional view of decision makers as passive. According to the authors of the article, the decision maker in the traditional research about the decision making process is a person "to whom things happen", - problems arise, opportunities appear, etc. What is missing is inspiration and an ability to inspire others, something which, according to the authors, makes people reach beyond their bounded rationality and get new insights. In general the criticism of the view of decision makers as passive which Langley et al. (1995) have, is part of a more general criticism by the authors regarding the dehumanization of the decision making process they identify in traditional research about decision making.

Concerning the decision maker as a carrier, the authors refer to the carrying of memories, experience and training the individual decision makers have and which have an impact on their world-view. According to Langley et al. (1995), this aspect of the decision makers have not been taken into sufficient account in traditional theories on the decision making process.

Therefore, the authors recognize a need to include this in models over the decision making process and have, according to them, done so in figure 4.5 below where organizational decision making as an insightful process driven by iteration is presented.

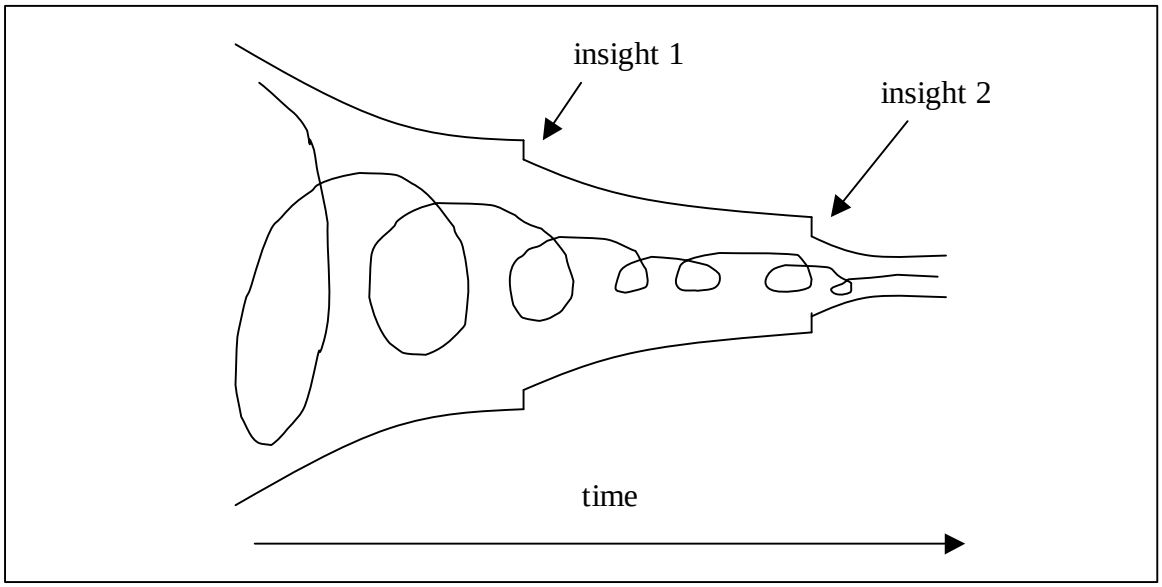


Figure 4.5 Organizational decision making as insightful, driven by inspiration (modified from Langley et al., 1995)

In the model, which is a development of the model in figure 4.4, convergence in the decision making process no longer is represented by a completely gradual, smooth process, but rather as a process which is gradual and smooth at times, which at irregular intervals gets interrupted by insights which are inspired and in turn can inspire others in the process. The inspiration generated by these insights, enable the process to converge quicker.

Regarding the assumption in traditional research that the processes that underlie a decision actually can be isolated from each other and from much of the collective reality experienced in the organization, Langley et al. (1995), also have a different viewpoint. According to them, research about decision making processes have to move beyond an analysis of single, isolated decisions and instead study the whole organization as a system of decision processes. The authors thereby want to focus on what they call "issue streams" instead of "decision processes".

This focus on issue streams instead of decision processes, stresses linkages between issues and interaction between the issues in order to understand how organizations behave when making decisions. Langley et al. (1995), identify

three distinct categories of such linkages, - sequential, lateral and precursive linkages (see figure 4.6).

Sequential linkages refer to linkages about the same issues interrelated over time. Lateral linkages refer to linkages between different, but related issues which share resources or are about the same context. Finally, the third category of linkages the authors identify, precursive linkages, are linkages which are created due to issues affecting future decisions on other issues.

On basis of the discussion regarding the different possible linkages existing between issues, the authors develop their idea about "issue streams" to "issue networks". These issue networks are complex networks of interrelated issues which develop dynamically over time and consist of the various lingages forms described above.

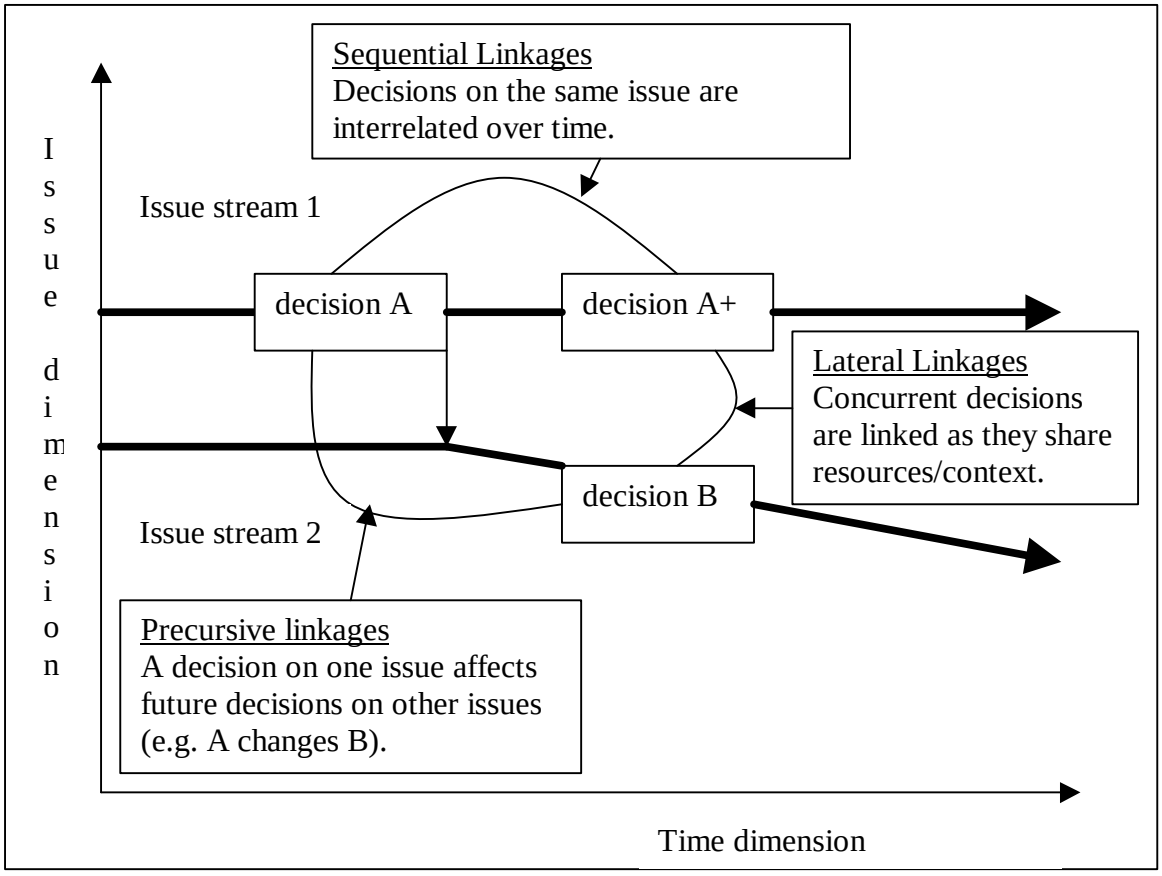


Figure 4.6 Types of decision linkages

Based on the level of intensity between the linkages between different issues, decision making can, according to Langley et al. (1995), be seen as dependent

on the type of organization in which they exist. The authors suggest five different main types of linkages (or coupling) in this regard on a continuum from tight to loose. These are (ordered from tight to loose linkage types), - ”fully-coupled issue networks”, ”stylistically-coupled issue networks”, ”intricately-coupled issue networks”, "formally-coupled issue networks”, and ”loosely-coupled issue networks”.

It is beyond the scope of this thesis to describe these types of linkages in more detail, except that, according to the authors, it can be presumed that "conditions of stability in an organization as well as the presence of slack [will] drive [the organization] towards the loosely coupled end, while those of resource scarcity, change and especially crisis would encourage it to move toward the tightly coupled networks" (p. 275).

Based upon the discussions on linkages and couplings, the authors present a new model over organizational decision making (see figure 4.7) where the decision making is seen as an interwoven process which is driven by the interrelated and linked issues.

4.3 Criticism of decision making process theories

Naturally, there have been arguments regarding the relevancy of the different decision making theories covered in this chapter. Some of the criticism regarding the models have already been mentioned in reference to, for example, the section covering the work of Langley et al. (1995), where the models presented by these authors actually are based on criticism of previous models by other researchers studying decision making.

A few comments concerning other relevant criticism are covered in the following three sections where criticism of the three major works in the research area discussed above, - Simon´s (1960) sequential model, the garbage can model proposed by Cohen et al. (1972) and the decision making process models presented by Langley et al. (1995), are presented.

4.3.1 Criticism of Simon´s (1960) sequential model

The decision making process model advocated by Simon (1960), has been criticized, first, because of the fact that it views the decision making process as a series of sequential steps (the garbage can theories have their origin in this criticism), second, regarding *which* steps are included in the decision making

process and *how many* steps can actually be recognized in the process (e.g. Mintzberg et al. 1976, Nutt 1984, Bower 1970 and Burgelman 1983).

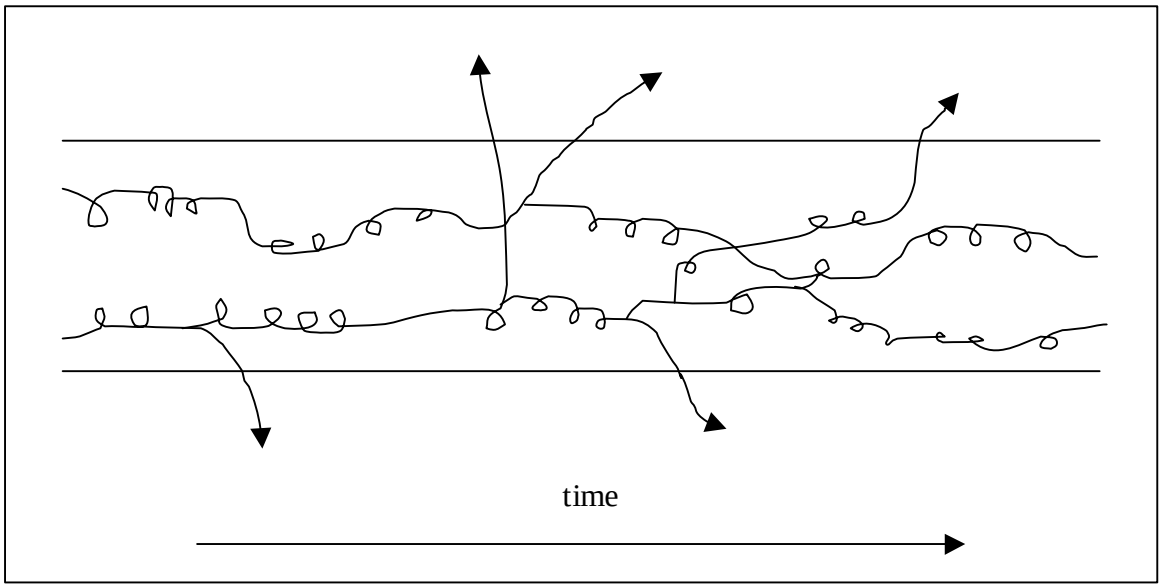


Figure 4.7 Organizational decision making as interwoven, driven by linkages (modified from Langley et al., 1995)

4.3.2 Criticism of the garbage can model

Regarding the garbage can model ultimately represented by the work of Cohen et al. (1972), Forester (1996) argues that for participatory, interactive decision making, the garbage can is not an adequate metaphor in this model. This is so, since choices, problems, participants, and solutions interact, and transform each other in such a process which can be regarded as explorative in character. According to Forester (1996), the garbage can model has an important weakness in that it misses this interactive exploration.

Langley et al. (1995), criticize the garbage can model due to the fact that they see it as too general in its explanations of variance. According to them, the garbage can is a "convenient way to deal with all unexplained variance: whatever researchers fail to understand using more traditional theories can be safely dumped into the garbage can" (p. 262).

In general, the garbage can model approach has been criticized for not taking account of organizations with ambiguous goals where many decision makers are involved and diffuse actions take place (e.g. Allison 1971, Weiss 1982).

4.3.3 Criticism of the decision making process models presented by Langley et al. (1995)

Although the research of Langley et al. (1995), have been used as a reference in research regarding organizational decision making (see, for example, Wierenga & van Bruggen 1997 and Weick, 1996), we have not been able to find any criticism of their models on decision making. However, we have found a couple of weaknesses their models in our view possess. In brief they can be described as follows:

First, the visual models as they are presented in the article, are insufficient and ambiguous in that all models, except the one depicted in figure 4.6, lack an axis showing time (in the other models such an axis is added by us, therefore, these models are labeled "modified"). Although the reasoning behind the models is well described in the text of the article (for example regarding the influence of time), the models, in our view, have a weakness in that they are not self-explanatory in themselves.

Another related weakness we identify with the models of Langley et al. (1995), is that they are many, showing different aspects of the same underlying theme, - organizational decision making. In our view, the models would be more appropriate if they could be combined into a general model for all aspects of organizational decision making.

A third disadvantage with, especially the model over organizational decision making as an interwoven process, driven by linkages which is depicted in figure 4.7, is that this model, at least in our opinion, hardly tell the beholder more than the garbage can model criticized by the authors themselves (see section 4.3.2).

The fourth issue we see as neglected in the model is a bit more difficult to explain in just a couple of sentences. This concerns the "smoothness" of the models as well as the effects of insights among individual decision makers. According to the authors of the article, the narrowing to the "funnel" in the figures 4.4 and 4.5 respectively, reflects the "construction of an issue". Relevant here is then, how does this construction *usually* proceed, or how *can* this construction proceed?

Since these models refer to organizational decision making all special features of decision making in groups must be in considered (see section 4.2.2 above). In the funnel-model of how an issue slowly is constructed, there a two lines which limit the size of the funnel and which converge towards each other as outer limits of the scope of the issue which is to be construced and which refers to what the issue is about. These outer limits therefore also can be said to symbolize the different views about the issue in the organization (cf. Beach, 1997), and

representing different views as for the preferred direction the construction of the issue should take, depending on the individual and sub-group preferences which exist regarding the issue.

Supporting this, is the high probability of disagreements over what the issue is about and the preferred solution which might exist among different individuals/sub-groups in the organization. If this should not be true, the whole idea with the funnel and a construction of an issue would not be relevant, since it then would be possible to agree about an issue right away without first having to "construct" the issue.

The questiion then is, why are there only two outer limits in the funnel? Naturally, there should be as many outer limits as there are distinct views about the direction and preferred solution about the issue about to be constructed.

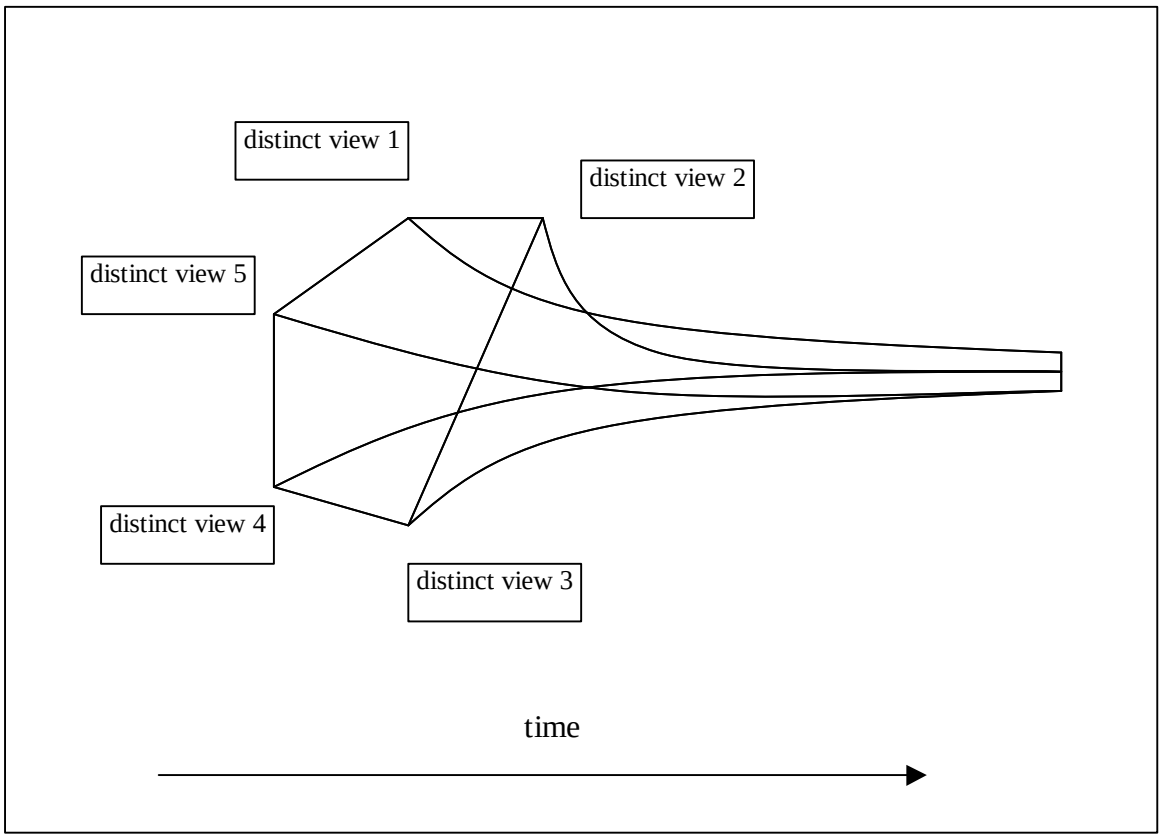


Figure 4.8 Organizational decision making as convergence, driven by iteration and different views regarding the direction and extent of an issue represented by individuals/subgroups

This would make the funnel, in case there are five distinct views about the solution of a problem in a group, having 5 distinct outer limits which will have to

converge towards each other in order to achieve an organizational wide "decision" regarding the issue at the end of the funnel.

Depending on the degree of differences between different individual´s/sub-group´s preferences about the issue, the outer limits would also lie on different distances from each other and from the central point of the funnel. If this reasoning is held true, a better model over Organizational decision making as convergence than the one used by Langley et al. (1995) in figure 4.4, could be visualized as the model in figure 4.8.

If one goes on questioning the other models proposed by Langley et al. (1995), one can ask why the researchers find it so natural that the decision process is convergent? Although the model in figure 4.5 recognize the impact of insights in the decision making process as having an effect on the level of convergence, they seem to regard these insights of different individual decision makers as only

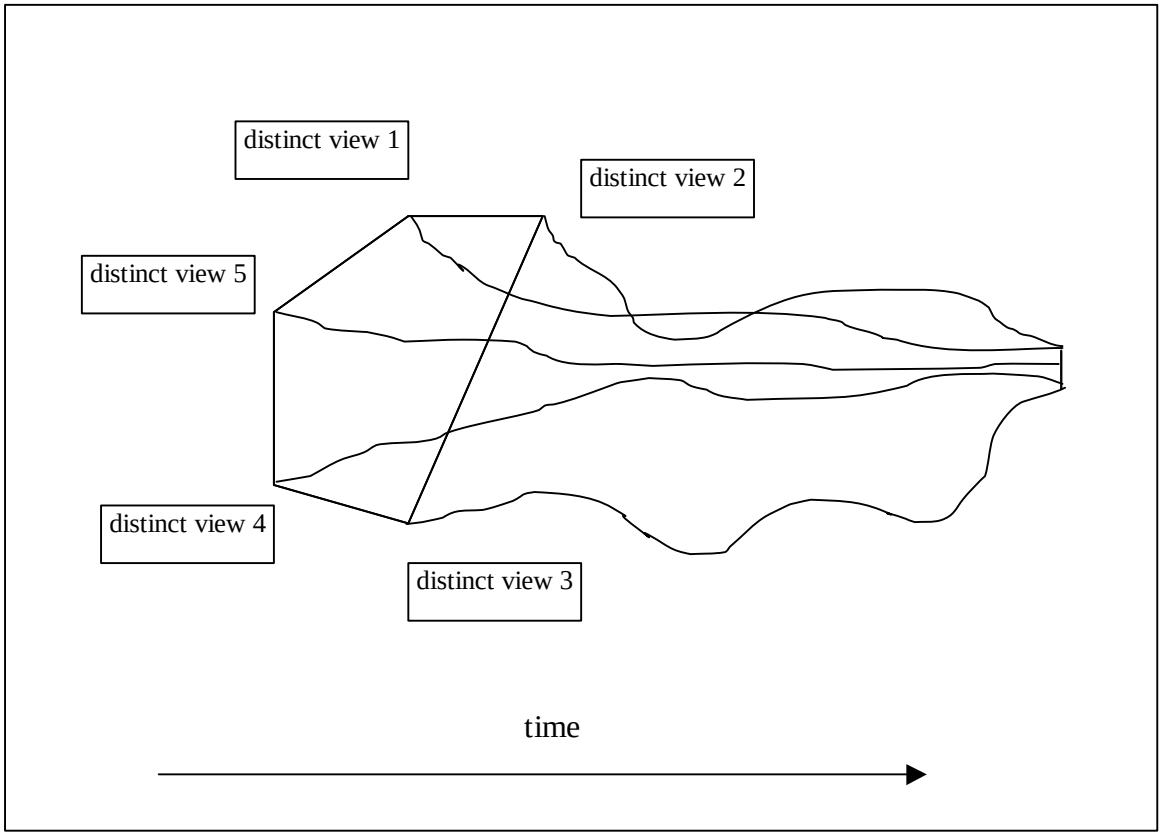


Figure 4.9 Organizational decision making as convergence and divergence, driven by iteration and different views regarding the direction and extent of an issue represented by individuals/subgroups

positive and converging for the decision making process, making the construction of an issue converge even sharper when this happens.

Is this necessarily true? We would like to argue that sometimes, when individual decision makers have these insights, they might not necessarily be in the lines of the other decision makers opinions and preferences about the issue being constructed. Sometimes it is even possible that the individual insights in the process might make the construction of the issue *diverge*, since this insight might make the view of the issue of the individual who has got the insight become even more different than the other decision makers´.

Viewed in this way, the decision making process as described by Langley et al. (1995) in the model depicted in figure 4.5 could be developed in order to reflect this better. Our view of how this could be done is represented by the model in figure 4.9.

4.4 Techniques designed to support group work

Before we move on to group decision support systems and describe these in more detail, we give a short summary of three common techniques designed to support groupwork (Delbecq et al., 1975) and which are sometimes used in connection with the use of a GDSS (Gray, 1994). These three tecniques, which are described in the following sections 4.4.1 to 4.4.3 respectively, are brainstorming and the interacting group method (IGM), the nominal group technique (NGT), and the Delphi method.

4.4.1 Brainstorming and the interacting group method (IGM)

Osborn (1957), founded the term "brainstorming" and since his publication of the book regarding the issue, there has been an ongoing discussion about the term and the value of the method in a group decision making context.

Brainstorming is an attempt to enhance the creativity of decision makers by facilitating and encouraging an exchange of ideas and a free, creative discussion between the involved individuals. Brainstorming as a technique, can also be used individually, and according to Paulus & Paulus (1997), it is often more effective when used in that way.

By using brainstorming, one tries to separate the idea generation from the idea evaluation. Why then is this important? The premise behind, is that premature evaluation of ideas tend to make participants in the group less imaginative and

creative as well as more cautious about generating ideas they beforehand think will be rejected (Beach, 1997). The results of such a premature evalutation might therefore be fewer new and potentially giving ideas for the group to decide on.

In order to achieve the end of not risk to neglect good suggestions, Osborn (1957), outlined four rules for brainstorming which, according to him, are important to consider in order to avoid premature evalutation of ideas. These four rules are:

1. *Generation of as many ideas as possible.* - The more ideas generated the better. Due to a higher quantity of ideas, the chances that good ideas will come up are greater.

2. *Do not criticize ideas as they are expressed.* - It is important that criticism of novel ideas must be withheld during the stage when they are generated and expressed for the other decision makers. Otherwise participants might feel discouraged from coming up with new ideas.

3. *Encourage odd ideas.* - Strange, odd ideas should be encouraged in the idea generation. Due to this, new, unique, previous unapparent options might be discovered.

4. *Build on the ideas of others.* - By building on other´s suggestions and use them as a source for inspiration, new better ideas might be produced. The usage of old ideas as a source for inspiration is sometimes called "piggybacking" and should be encouraged in the process.

Although there are many opinions about the effectiveness of group brainstorming compared to individual brainstorming, it is interesting to note that many of those who participate in group brainstorming rate their performance in these events more favorably than those who perform alone (Camacho et al., 1993).

However, it is easy to find critical research about group brainstorming. Studies which have compared group- with individual brainstorming, have found that individuals in groups often generate as much as 50% fewer ideas than individual brainstormers and that fewer of the ideas generated are of a high quality (see, for example, Diehl & Stroebe 1994 and Mullen et al. 1991).

Why then is group brainstorming not effective? Are there any explanations? According to Camacho & Paulus (1995), a possibility might be that some of the individuals participating are uncomfortable in group settings and therefore produce bad results.

Another explanation is provided by Diehl & Stroebe (1987), in that groups might produce fewer ideas than individuals due to what they call "production blocking".

This refers to the situation when as the group size increases, participants must wait longer and longer before they get the turn and can provide their ideas.

IGM which is a termed used by some researchers (e.g. Clayton, 1997), is a process in which the participants openly discuss their ideas, give feedback and analyse the other participants´ work. IGM therefore is similar to what is usually termed brainstorming.

4.4.2 The nominal group technique (NGT)

According to Turban & Aronsson (1998), the nominal group technique consists of a sequence of activities in the decision making process. The following are the activities which are included: silent generation of ideas which are written down, "round-robin" listing of ideas, preferably on a flip chart, discussion of the ideas presented, silent listing and ranking of priorities, a discussion regarding these priorities and finally a silent re-ranking and rating of priorities.

By using the nominal group technique, the group of decision makers are provided a forum in which they can develop and write ideas face-to-face, but the development of ideas becomes individual and independent of other group members´ views and influences. According to Delbecq et al. (1986) and Delbecq & Van de Ven (1971), NGT avoids many of the problems associated with brain-storming and the nominal group technique is, according to them, more effective for idea generation than brainstorming. While the technique, according to the authors, not necessarily is superior to the Delphi method in order to generate ideas, the nominal group technique is better suited for structured groups such as boards of directors.

4.4.3 the Delphi method

According to Clayton (1997), the Delphi method is similar in many ways to the nominal group technique, but has characteristics which are not found in either NGT or brainstorming. The first characteristic regards idea generation which in the Delphi method is carried out not only individually and independently, but also isolated and anonymously by each decision maker involved.

The second characteristic regards communication between individuals which in the Delphi approach is managed by a supervisor and occurs by using written questionaires and reports for giving feedback.

An important advantage of the Delphi method in relation to NGT and IGM techniques, is that it can provide a communication medium where individuals can participate without meeting physically. This reduces costs in time and money needed for travelling, often long distances. Face-to-face meetings are often necessary during group decision work taking advantage of either the nominal group technique and interacting group methods.

Further, decision makers participate anonymously in Delphi processes. This is a strict requirement of the method. The anonymity has an important advantage in that it can substantially reduce certain social-emotional behaviour often found when using other methods, which might distort the decision making process and produce inferior results (ibid.).

4.5 Group decision support systems

So far in this chapter we have discussed the phenomenon of decisions and decision making. Thereafter we added a dimension by discussing decisions and decision making in a group context. In this final part of the chapter, another dimension is added, - the dimension of technologies, supporting and influencing the decisions and the decision makers in group decision situations.

As mentioned in chapter one, a group decision support system could be defined as a computer based information system that enhances group decision making by facilitating the exchange and use of information by group members, and interactions between the group and the computer, to formulate and solve unstructured problems. In the following, some important aspects regarding the support of the decision making process by a GDSS will be outlined.

In section 4.5.1, group decision support systems and their effects on decision effectiveness is presented. In section 4.5.2, different support modes used in group decision support systems and different categorizations of such support modes are covered. In section 4.5.3, a theory regarding support mode and effectiveness of group decision support systems by Zigurs & Buckland (1998) will be presented. Finally, in section 4.5.4, research on group decision support systems and traditional group work techniques such as those presented in section 4.4 will be covered.

4.5.1 group decision support systems and effectiveness

The motive for using a group decision support system is of course to improve the effectiveness of the decisions made by improving decision making processes.

Group decision making effectiveness can, according to Vroom & Yetton (1973), be evaluated on basis three main criteria, - quality, timeliness, and member commitment to the decision.

For the first of these criteria, quality, this can be achieved by, on the one hand, use of processes that can contribute to thorough information processing, such as comprehensive search for information, critical evaluation of collected information and alternatives and, on the other hand, use of processes that help the decision makers stay away from common behavioural traps in the decision making process, such as groupthink and risky shifts.

A high degree of timeliness can be achieved by using processes that help the group continue efficiently through its work and maintain high degrees of member motivation throughout the process.

Finally, member commitment can be increased by using group processes that enable all members in the process to participate and encourage consideration of all views and preferences in the group (Larson & LaFasto 1989).

According to Poole (1995), the ability of group decision support systems to enhance communication and information exchange, process complex information, and coordinate and organize group activities are the main improvements in effectiveness by using a GDSS in the decision making process. According to the author, group decision support systems influence three, as he sees it, critical functions in the decision making process, - exchange of information, information processing and group management.

Regarding exchange of information, group decision support systems can provide the participants in the decision making process supporting means for sharing information, such as public displays and messaging between them. Features in the form of public screens, for example, can help the decision makers display information for all participants and at the same time, make it possible for them to give inputs which are reflected on the screen for all to view. This kind of system can be valuable in case the objective is to list participants´ ideas and discuss, and evaluate these ideas.

The advantage of public screens over traditional, manual devices such as flip charts and overhead projectors is that public screens more easily can be connected to the rest of the group decision support system or even the whole information system of the organization, it can reflect changes quicker and it is more flexible in use.

Apart from this, some researchers mean that group decision support systems can increase member participation (e.g. Gallupe et al., 1991). To follow up the

example with public screens, a possibility is to give the participants keyboards or other means for input with which they can input information which can be showed on the public screen. Since input is not managed by an authority in the form of a discussion supervisor or chairman who handles turntaking, participant input is encouraged.

Also, the possibility for several members to give inputs simultaneously, removes the blocking of participation, which inevitable occurs when only one decision maker can speak at a time (Gallupe et al, 1991, Jessup et al. 1990), also note that if this kind of input to the discussion is anonymized, some decision makers, who would otherwise not participate much in the process, contribute with relatively more ideas.

By improving communication and information exchange, group effectiveness on all three main criteria for group decision making effectiveness; quality, timeliness, and member commitment to the decision, can be increased. Since the decision makers can communicate more freely and since the participants have access to more relevant information, a higher decision quality can be achieved. Timeliness can be increased by simply speeding up the flow and in- and output of information and commitment of the decision makers is likely to increase due to improved participation in the group based on the increased communication possibilities (Poole, 1995).

Moreover, with the use of a GDSS there are increased possibilities to improve the ability of workgroups to engage in complex information processing tasks during meetings regarding, for example, computation capabilities and statistical cababilities which can be accessed in a quick and flexible manner. Traditional manual modeling and model building would be too complex and time consuming and complex model building methods would hardly even be attempted by decision groups not supported by proper GDSS software.

Furthermore, group decision support systems can help in structuring the work of a group of decision makers by facilitating, and to some degree, automating the use of such procedures in decision making. Brainstorming, which in itself is a very unstructured technique used to support group work, can, for example, be organized in that the members electronically input their ideas and then the ideas are displayed on a public screen.

According to Pavitt (1993), the quality of the decisions made by groups who use plans or other structured procedures in their decision making tend to increase. The increased structuring of the work can aid the decision making giving increased vigilance regarding information by supporting a more careful gathering and analysis of information and alternatives.

4.5.2 GDSS support modes

How a group of individuals use a group decision support system, is indicated by the GDSS term support mode. According to many researchers, (see, for example, Dickson & Patridge 1993 and Ellis et al. 1991), the way in which a group of decision makers are supported while they are interacting with a GDSS has a profound effect on the result of the use.

Different researchers have made different categorizations of GDSS regarding their modes of support. Ellis et al. (1991) characterized the support into a time and space taxonomy. Building on this taxonomy, Dennis et al. (1988), made a further categorization based on group size, group proximity, and time dispersion.

Finally, Dickson & Patridge (1993), have used the kind of facilitative support involved as a basis for their categorization. One form of GDSS, according to their way of categorizing, is a user-driven GDSS, i.e. a group decision support system which has all functions and features available for every user. Another form identified by the authors, are facilitator-driven GDSS where one of the decision makers in the group or a person outside the group of decision makers has a role of aiding the GDSS session. He or she directs the users regarding which features to use, when and how to use them.

A related kind of support to the two forms discussed by Dickson & Patridge (1993), is what Jarvenpaa et al. (1988) call the chauffeur-driven type of support. This support mode involves a person, who is not a member of the decision team, working with technological issues and administrative steering concerning the system. The difference between a chauffeur-driven GDSS session and a facilitator-driven, is that the chauffeur does not affect the group decision process which is something a facilitator might do. A facilitator can, for example, direct the process and act as a leader for the other participants.

A final support form identified by Dickson & Patridge (1993), is to use a hybrid form with a facilitator as well as a chauffeur used in the process. According to the authors, this form is efficient in that it permits the facilitator to concentrate on the group supporting process. However, it is more expensive than the previously described forms since the cost of a facilitator as well as a chauffeur must be taken into account.

4.5.3 The theory of task/technology fit

An interesting approach regarding support mode and effectiveness of group decision support systems have been done by Zigurs & Buckland (1998). They

have categorized support according to a theory they call the theory of task/technology fit. According to them, an appropriate fit between task and technology should result in higher performing groups. However, it is important to note that the relevant measures of this performance may vary, given different tasks and groups. The authors identify five distinct kind of tasks for which different support aspects should be emphasized, - simple tasks, problem tasks, decision tasks, judgment tasks and fuzzy tasks. A comparison of these identified tasks and their characteristics is summarized in table 4.2 where the tasks have been contrasted to the four dimensions of task complexity by Campbell (1988).

The four dimensions identified by Campbell (1988), - outcome multiplicity, solution scheme multiplicity, conflicting interdependence and solution scheme/outcome certainty, refer to the complexity level of a task. The first of these, outcome multiplicity, refers to situations when there are many desired outcomes of a task and each of the outcomes requires separate information processing. In tasks with outcome multiplicity, there are many stakeholders and each stakeholder has different expectations about what the objectives of the task are.

Table 4.2 The five kind of tasks identified by Zigurs & Buckland (1998) viewed in relation to the dimensions identified by Campbell (1988)

	simple tasks	problem tasks	decision tasks	judgment tasks	fuzzy tasks
Outcome multiplicity	no	no	yes	no	yes
Solution scheme multiplicity	no	yes	no	no	yes
Conflicting interdependence	no	yes or no	yes or no	yes or no	yes or no
Solution scheme/ Outcome uncertainty	not applicable	low to high	low to high	low to high	low to high

The second dimension, solution scheme multiplicity, refers according to Campbell (1988), to situations when there are many possible courses of action

which can be chosen in order to attain a goal. This task dimension tend to increase the information load which has to be dealt with in resolving the issue.

So called conflicting interdependence is a third dimension described by Campbell (1988) which may exist among solution schemes where an adoption of one of the schemes might conflict with the adoption of another possible scheme.

Finally, the fourth dimension termed solution scheme/outcome uncertainty refers to the extent to which there is uncertainty about whether a given solution scheme actually will result in a desired outcome. The level of the uncertainty might be dependent on such things as the level of explicity in the outcomes, the scope of the problem and the degree of difficulties involved in trying to measure outcomes.

Simple tasks are such tasks which have a single desired result and no conflicting interdepence with other tasks. For this kind of task, the focus of support, according to Zigurs & Buckland (1998), should be on communication between the decision makers. This is so, since a too extensive focus on information processing for these simple tasks could interfere with basic needs of communication.

Brainstorming tasks is, according to the authors, a good example of tasks which can be regarded as simple in character. In brainstorming, the focus of the group is often on the single outcome of generating as many ideas as possible. In these situations, the most important support given by a GDSS regards communicative support for the giving of simultaneous, sometimes anonymous, input from many decision makers, displaying of ideas on a public screen, etc.

The next category of tasks identified by Zigurs & Buckland (1998) are problem tasks. Here the focus is on trying to find an ultimate solution which fulfills a single, well-defined desired result from a selection of multiple possible schemes. Since multiple solution schemes are present, the information processing requirements increases and the decision makers may have to configure the problem and see it from different angles in order to produce an ultimate solution. Therefore, when dealing with this kind of task, information processing capabilities is the most important support needed in order to help the decision makers deal with the increased load of information. According to the authors however, support for communication should be held low in order to avoid communication overload.

Like the support for communication, the level of process structuring should also be held low. This is so, since this kind of tasks do not usually involve distinct steps of procedure that might need agenda support of enforcement. As a matter of fact, too much structuring could actually distract the decision makers in their analyzing of the information (ibid.).

Decision tasks is a term used by the authors for tasks where the focus is on finding a solution which best satisfies multiple and potentially conflicting outcomes. For example, if an organization has limited economic resources but in a short time perspective needs to make different investments which together might be out of budget. Both investments are needed for the organization, but the needs are conflicting in that they compete for the same economic resources. In these tasks, each of the desired results involves separate information processing which in each of the cases imply both a high information load and a high information diversity. Each of the desired results are criteria against which the proposed solution is evaluated.

Thorough information processing support and, especially, support for evaluating information are requirements for this kind of tasks. In order to make sure that the group of decision makers carry out all the steps of criteria identification and evaluation against alternatives, a focus on a structuring of processes is also of great importance for decision tasks. As in the case of problem tasks, the authors argue for a low level of support for communication since communication overload otherwise may be the result.

Judgment tasks are tasks where the focus is on the solving of conflicts and problems regarding uncertain information associated with the task. For example, if the decision makers are going to make a decision regarding an issue, but the information underlying the decision is insufficient or uncertain. In this kind of tasks, the processing of information is once again of great importance, although support for communication is important as well. The structuring of processes should however be kept on a low level, since an overemphasis on such matters as setting and enforcing agendas might limit a free exchange of information, and therefore hamper communication which is an important aspect in tasks of this kind.

Fuzzy tasks is a final category of tasks identified by Zigurs & Buckland (1998). These tasks have very little focus and are characterized by vagueness. When dealing with this kind of problems, the decision makers tend to concentrate most of their effort on trying to understand and structure the problem. Before the problem is clearly identified and structured, it is very difficult to try and solve it. Due to the high complexity, information processing is important and the communication between the decision makers, the gathering of information and use of structured techniques are all important when having to deal with fuzzy tasks.

The latter techniques, however, should be adapted to the needs of the group and be flexible in character. A too strict agenda is not good, since it could lead to biasing the definition of the problem towards the direction provided by the

structure rather than leading to the discovery of the proper problem definition which is free of an imposed structure (Gopal et al. 1992-93).

An example of a fuzzy task used in the GDSS literature (see, for example, Watson et al. 1988 and Ho and Raman 1991) is the Foundation task. In this task which is an example of a task with conflicting values and goals, uncertainty, information load and diversity, a group allocate funds for a philanthropic foundation to competing organizations (Watson et al. 1988).

Some research studies have implemented the Foundation task with a GDSS with good communicative support but with a low level of focus on processing of information (Watson et al. 1988, DeSanctis et al. 1991). These studies did not found any positive effect for the GDSS. However, later research (Sambamurthy and Poole, 1992) have improved the information processing capabilities of the GDSS which has had a positive effect for the quality of the results.

As obvious from the above discussions regarding task and technology fit, Zigurs & Buckland (1998) divide the technology options for dealing with the different kind of tasks into three categories, - communication, process structuring and information processing.

According to the authors, communication can be regarded as "any aspect of the technology that supports, enhances, or defines the capability of group members to communicate with each other" (ibid.). The communication support dimension therefore includes elements such as possibilities for anomymity, simultaneous input and group display. Included in this dimension is also the physical configuration of communication channels since this is the basis for how the decision makers can communicate with each other.

Process structuring can, according to Zigurs & Buckland (1998), be defined as "any aspect of the technology that supports, enhances, or defines the process by which groups interact". This dimension includes such things as agenda facilitation and enforcement.

Finally, information processing according to the authors, refers to "the capability to gather, share, aggregate, structure, or evaluate information". Included here are, for example, multiattribute utility analysis and templates used in order to structure problems.

Viewed like this, the support dimensions and their respective influence in the different kind of tasks identified could be summarized as in table 4.3 below.

Table 4.3 Fit profiles of task categories and technology dimensions (Zigurs & Buckland, 1998)

	Communication Support dimension	Process structuring dimension	Information processing dimension
Simple tasks	high	low	low
Problem tasks	low	low	high
Decision tasks	low	high	high
Judgment tasks	high	low	high
Fuzzy tasks	high	medium	high

4.5.4 GDSS and traditional group work techniques

"The present approach of using the technology to mechanize group processes such as voting, Delphi, and nominal group techniques is crude and rudimentary at best. We can anticipate that new ways of gaining group interaction and group consensus will be developed that take advantage of the capabilities offered by GDSS" The words are Gray´s and Nunamaker´s (1989, p. 283) regarding the use of traditional group work techniques and GDSS. Despite this, many traditional group work techniques, such as the nominal group technique, brainstrorming etc. descibed in section 4.4, have been used in group decision support systems of different kinds.

According to Huber (1984), use of the nominal group technique in a GDSS can eliminate disadvantages of the technique and bring three important advantages. First, joint use of the nominal group technique and GDSS can reduce waiting time which is due to transmitting and recording information. Second, errors and error-related frustration associated with this transmitting and recording of information can be reduced. Finally, the exchange of sensitive and anonymous information is facilitated.

Apart from these advantages of joint use of NGT and GDSS, Roy and Gauvin (1996), pay attention to the fact that feedback, in the form of immediate feedback at the end of tasks, can be improved by using such a joint system.

Huber (1984), also present an example of a GDSS session where the GDSS is used jointly with the Delphi technique. Here, two advantages of joint use is discovered. First, the information flow to the respondents is very quick since postal mail no longer is needed. Also, the same applies for the information flow back from the respondents. Finally, the displaying of aggregated results in the form of graphs, tables, etc. can be done very quickly which enables very fast result feedback to the respondents.

Brainstorming in a group decision support system context is often referred to as EBS which stands for electronic brainstorming (see, for example, Cooper et. al 1998, Dennis &Valacich, 1993). According to Cooper et. al (1998), EBS groups of four or more decision makers produce more nonredundant ideas than do groups using verbal brainstorming. Also, electronic brainstorming groups are at least equivalent and sometimes superior in productivity to nominal groups. In groups larger than that (with a total of over 12 decision makers), electronic brainstorming groups are a lot more productive than both verbal and nominal groups.

So what are then the reasons for these advantages of electronic brainstorming? According to Cooper &Gallupe (1993), there are two important factors which make electronic brainstorming superior over other brainstorming forms. First, the possibilities provided to reduce production blocking and evaluation apprehension as well as the promotion of a greater span of thought by the participants taking part in the brainstorming are greater in groups using EBS than in groups using the more traditional techniques. Second, the technology in itself can, according to the authors, help in counteracting so called "free riding" if that is considered as negative in the decision making process (ibid.).

5. Theoretical Frame of Reference: Knowledge Management

In this chapter, the second chapter in the theoretical frame of reference, theories regarding knowledge management and the related term knowledge creation are presented and discussed. This chapter correspond to purpose two, - To examine theories on knowledge management in an organizational context.

In the chapter, we present and discuss research findings, first regarding the concept of knowledge which was briefly covered in chapter 3. In this chapter we build on that discussion and present a more detailed discussion on the concept of knowledge.

The purpose of this chapter is to give a summary of important research findings regarding knowledge, knowledge creation and knowledge management. Apart from being used as a theoretical background in order to better understand the system development process and the empirical research described later, our intention with the chapter is to fulfill the second purpose of the thesis.

5.1 Knowledge

In section 5.1.1 a coverage on knowledge categorizations as worked out by some researchers in the area are presented. This section is followed by a presentation of the two terms tacit knowledge and explicit knowledge in section 5.1.2. Finally, a discussion on the theories presented is given in section 5.1.3.

5.1.1 Knowledge categorizations

Since the concept of knowledge is difficult to define due to the context sensitivity of the term, categorizing knowledge is a difficult task. According to Ruggles (1997) it therefore might be useful to begin with a broad typology of knowledge, without constraints, which describes knowledge in terms of what the knowledge is about in more general terms.

An example of such a typology, which according to the author is relevant, consists of four categories, - process knowledge, factual knowledge, catalog knowledge and cultural knowledge. Knowledge of all of the four kinds can be either tacit or explicit (see section 5.1.2) and can be possessed by either individuals or a whole organization.

Process knowledge can, according to Ruggles (1997), be referred to as descriptions over how to do things well or how to do things in order to maximize output, profit, etc. This kind of knowledge come in handy in situations where the motive lies in maximizing efficiency and optimizing operations. This kind of knowledge is achieved by benchmarking.

Factual knowledge can be likened to the simple information about people, things and phenomena individuals have. This kind of information is often easy to document and the information as such can be considered as being of low value unless it is in any way synthisized and viewed in a proper context where it can be used as knowledge.

Catalog knowledge refers to such knowledge as knowing where things are. Individuals who have this kind of knowledge have expertise which the author compares to such knowledge which often can be codified into a sort of Yellow Pages or other directory. However, since the dynamics which exist inside of organizations change so rapidly, those individuals who possess this kind of knowledge might be very valuable for the organization since they know where to find the right knowledge quickly.

Finally, social and political knowledge of how things actually get done in an organization is referred to as cultural knowledge by to Ruggles (1997). This kind of knowledge covers the rules and norms of organizations, knowledge about which might be very important in order to carry things out in the organization. According to the author, this kind of knowledge in addition to catalog knowledge are the two most difficult knowledge areas to handle when an organization becomes larger.

Scarbrough (1996), categorizes and describes different forms of knowledge identified by different researchers. In total he identifies five different categories of knowledge, - strategical knowledge, structural knowledge, systems knowledge, cultural knowledge, and routines and embodied knowledge.

Knowledge which, according to Scarbrough (1996), can be characterized as strategical are such knowledge which refers to the embrained knowledge which members of top management have. This kind of knowledge includes the cognitive understanding and mind-sets which form strategy-making.

Structural knowledge refers to knowledge which is embedded within the structure of the organisation. According to Whipp & Clark (1986), this kind of knowledge refers to knowledge about the coordination and structuring of activities. Sometimes structure is viewed as something negative for the purpose of learning and adaptation, but according to Scarbrough (1996), structural knowledge is important in that it can be regarded as a storage of accumulated and codified

experience.

Systems knowledge refers to knowledge which exists in the major systems of the organization. Examples of such knowledge are the design of computer systems or different kinds of control systems. This kind of knowledge is related to structural knowledge in that it is closely linked to specific definitions of roles and different kinds of structural features. According to Scarbrough (1996), systems knowledge can be transferred both within and across organizations.

Like Ruggles (1997) Scarbrough (1996) identifies a category of knowledge which he refers to as cultural knowledge. Scarbrough´s (1996) interpretation of this knowledge category is similar to that of Ruggles´ (1997), however, Scarbrough (1996) adds that cultural knowledge is communicated in the form of symbols and stories, rather than through objective facts or data.

The final category identified by Scarbrough (1996), routines and embodied knowledge, refers to so called tacit knowledge, the meaning of which is described in section 5.1.3 below.

A third researcher who, like Ruggles (1997) and Scarbrough (1996) have categorized knowledge is Blackler (1995). Like scarbrough, Blackler presents five knowledge categories. However, he stresses that the categories of knowledge he distinguishes not are distinct and the categories in some cases might be overlapping. The five knowledge categories which he, in the form of metaphors, presents, are embrained knowledge, embodied knowledge, encultured knowledge, embedded knowledge and encoded knowledge.

The first knowledge category, embrained knowledge, refers to abstract knowledge which is created through thinking and conceptualization. Different kind of knowledge that an individual possesses is compared and by combining existing knowledge the individual can achieve new knowledge.

Embodied knowledge is the practical knowledge which is achieved through actions. If an individual does something which he or she succeeds or fails with, he or she learns more about how to go about doing this particular task and therefore knowledge is achieved. This kind of knowledge therefore is similar to what Ruggles (1997) calls process knowledge.

Encultured knowledge refers to the same kind of knowledge as cultural knowledge in Ruggles´ (1997) and Scarbrough´s (1996) knowledge categorizations respectively.

According to Blackler (1995), embedded knowledge is knowledge which is embedded in routines of different kind. Routines involve knowledge in that they

demand knowledge in order to be created and knowledge is achieved when an individual learns a routine through reflection over what he or she actually does in order to carry out the routine.

Finally, encoded knowledge refers to knowledge acquired by using symbols and signals. By interpreting information in the form of symbols and signals, new knowledge can be created. This is so, since the signals and symbols can be compared to existing experience and knowledge and therefore new knowledge can be created.

5.1.2 Tacit and explicit knowledge

Many researchers in the field of knowledge and knowledge management distinguish between tacit and explicit knowledge (e.g. Nonaka 1994, Harris 1996 and Polanyi 1996).

Tacit knowledge is person dependent and is the kind of knowledge which we have in our minds but not necessarily can explain or transfer. It includes subjective, personal insights and intuitions.

According to Harris (1996), it can be defined as a combination of information, experience and context. According to Nonaka and Konno (1998), tacit knowledge comprise cognitive as well as technical elements. The cognitive elements of knowledge consist of the creation of mental models of reality, based on drawing on the experience which already exists and the making of analogious reasoning from this experience. The technical elements of knowledge refer to more concrete knowledge, such as know-how and practical knowledge about how to do things. However, since this knowledge is tacit, it is difficult for an individual to express this knowledge and/or transfer it to other human beings.

Explicit knowledge is, according to Handshuh et. al (1998), externalised tacit knowledge, which means tacit knowledge which has been "coded on a carrier". Hansen et. al (1999), defines explicit knowledge as "knowledge that can be codified, such as simple software code and market data".

According to Nonaka (1994), this kind of knowledge is realised the moment information is combined with the experience of individuals and the context the information exists in into new tacit knowledge. Nonaka also states that this kind of knowledge, in contrast to tacit knowledge, relatively easily can be stored in databases, directories, archives etc.

Owen (1999) compares tacit and explicit knowledge and view them in relation to each other. According to him, tacit knowledge can be referred to as knowledge

privately held by individuals. This kind of knowledge can then be contrasted with explicit knowledge, - shared knowledge amongst individuals within the organization.

5.1.3 Discussion

As obvious from the previous sections it is possible to characterize knowledge differently depending on the point of departure of the analysis and how the categorization is made; which and how many categories are chosen and how do they differ from each other? Do they overlap?

Although the interpretations of tacit and explicit knowledge to some extent differ between different researchers, this categorization, in our view, can be regarded as more homogenous than those described in section 5.1.1. The issue here does not concern how many knowledge categories there are, rather how the two identified categories should be categorized in relation to each other.

5.2 Organizational knowledge creation

After studying the concept of knowledge and the different kinds of knowledge which can be identified, an interesting issue regards how knowledge can be created.

In the following some of the research in the area of organizational knowledge creation and organizational learning are presented. In section 5.2.1 Nonaka´s (1994) theories on organizational knowledge creation are presented. This section is followed by an alternative view of the concept by Miller (1996) in section 5.2.2. In section 5.2.3 the categorization of learning into single- and double-loop learning is covered. Finally, in section 5.2.4. a discussion on the presented theories is given.

5.2.1 Nonaka´s (1994) theoretical framework

Nonaka´s (1994) theories on organizational knowledge creation has been cited in many research studies on knowledge management and knowledge creation after its publication (e.g. Davenport et. al 1998, Lei et. al 1999, Goodman 1998 and Lyles & Salk 1996).

According to Nonaka (1994), knowledge can be defined as "justified true belief". The focus on belief is, according to the author, what makes theories

concentrating on knowledge creation differ from traditional theories regarding knowledge. Theories which focus on knowledge creation regards knowledge as a dynamic process where "truth" is searched for by confirming personal conviction. In Nonaka´s opinion, there is a clear difference between knowledge and information. According to him, knowledge is created and organized through a flow of information, however, information as such is only a necessary medium through which knowledge can be formalised and created.

Regarding organizational knowledge, Nonaka (1994) claims that knowledge, on a basic level, can only be created by individuals, not by the organization to which the individual belongs. However, the organization can support and facilitate the development of the knowledge an individual has. Therefore, Nonaka argues that organizational knowledge can best be understood as a process through which individual knowledge first is amplified, then is canalized through the knowledge network which exists in the organization.

According to the author, commitment is one of the most important factors for the creation of knowledge in organizations. Nonaka (1994) distinguishes three main factors which together influence individual commitment in an organizational context. These are intention, autonomy and the fluctuation of the environment.

The first of these factors, intention, refers to the way the individual forms his or her view of reality and how the individual tries to find any understandable and reasonable information out of the environment. Without intention it is not possible to determine the value of the knowledge or information which is apprehended or which one tries to create.

Autonomy is a factor which can be applied at different organizational levels. This factor can be applied on an individual level as well as on group level or on both levels in combination. According to Nonaka (1994), autonomy among individuals can increase the probability for unexpected possibilities for true knowledge creation among these individuals. In this way, an organization which facilitate individual autonomy for the individuals and groups working in it, facilitate the creation of a creative environment.

Nonaka also argues that a high level of individual autonomy increase the possibilities for the creation of new knowledge as a result of increased motivation among the members of the organization. This is due to the fact that individuals working under conditions of a high level of autonomy to a greater degree can develop their intentions and absorb knowledge.

When it comes to the third factor, the fluctuation of the environment, Nonaka (1994), claims that a certain degree of fluctuation and chaos can result in new patterns of interaction between individuals in an organization and their

organizational environment. These infrequent, unpredictable patterns can make the individuals recreate their knowledge and question used routines and patterns. Therefore, this fluctuation is important since it creates new patterns of knowledge in the organization.

On basis of the discussion on the three main factors which, according to Nonaka (1994) influence individual commitment in an organizational context, a model with four different patterns for interaction between tacit and explicit knowledge is created (see figure 5.1). The patterns represented by the model, each represents ways in which existing knowledge can be recreated into new knowledge. Social interaction between individuals is a way in which this created knowledge thereafter can be expanded.

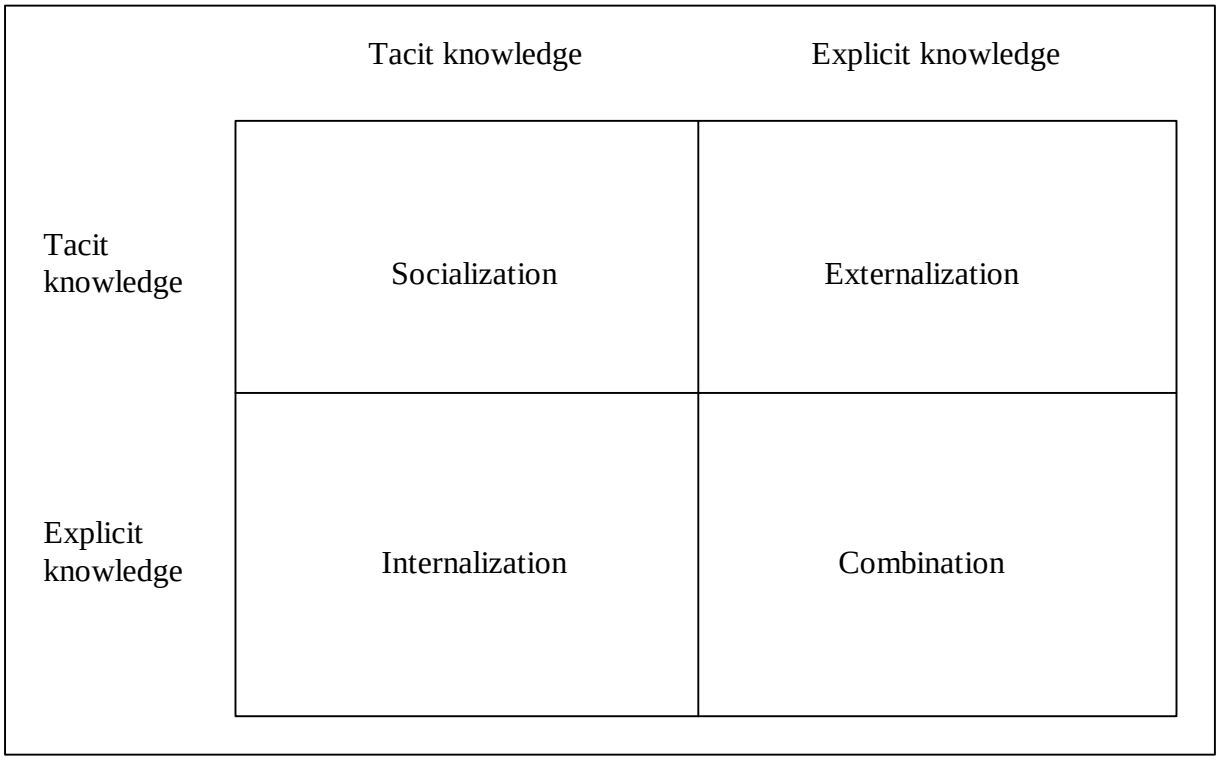


Figure 5.1 Four different forms for knowledge transfer according to Nonaka (1994)

The first form of knowledge creation which the author presents is termed socialization. In this form, knowledge is created by a transfer of tacit knowledge from one individual/group to another. Nonaka stresses the possibilities of transferring tacit knowledge without using language. Apprenticeships and on-the-job-training are used in order to examplify this. In these forms of knowledge

transfers, the apprentice or trainee work together with those who have the proper knowledge and learn from them through experience.

Socialization as a form of knowledge transfer demands certain things from the individuals/groups between which the transfer occurs. First, physical proximity between the involved parties is a necessity in order to transfer tacit knowledge. Second, the individuals must have a certain degree of common experiences and a common frame of reference in order to transfer knowledge in tacit form between them. If they do not have these in common, it might be difficult to understand the knowledge which is to be transferred.

The other "extreme" form of knowledge transfer distinguished by Nonaka (1994) is termed combination. In this form, knowledge is transferred explicitly through exchange mechanisms in the form of meetings and telephone conversations. The transfer of knowledge handled in this way, can result in the creation of new knowledge since the individuals in different ways try to formulate and formalize the knowledge they possess. Combination is usually done in three steps. First, explicit knowledge is collected. Then this knowledge is spread in the organization. Finally, it is adapted and stored in a more usable form, for example, in the form of notes, sketches or maps.

The third and fourth forms of knowledge transfer, - internalization and externalization, use tacit and explicit knowledge in combination. These are middle-forms between the two extreme forms socialization and combination.

In externalization, the individual expresses his or her tacit knowledge and interprets it to an explicit form which can be shared with others. This interpreted knowledge can exist and be understood without the requirement of physical proximity. Of central importance in this form of knowledge transfer is the use of metaphors. This is so, since it is important to be able to transfer the tacit knowledge into an understandable, explicit form.

The term internalization refers to knowledge transfer where the explicit knowledge created in the combination phase is recreated into tacit knowledge. The individuals identify and use the explicit knowledge which is relevant for them and transform this knowledge into tacit knowledge possessed by each individual.

Although each of the four forms for knowledge transfer and knowledge creation can exist in isolation, Nonaka (1994), stresses the interaction between the four forms as central for an understanding of organizational knowledge creation. These interactions is visualized in figure 5.2 on the next page.

In the figure, the complementary role of the four forms is stressed since both socialization and combination in their "pure" forms have disadvantages. On the

one hand, a lack of enthusiasm, engagement and personal meaning can make the combination form only an artificial interpretation of already existing knowledge. On the other hand, the possibilities of sharing knowledge can be limited in the socialization form which can result in difficulties in applying knowledge recreated in a different context than the context in which the knowledge originally was created.

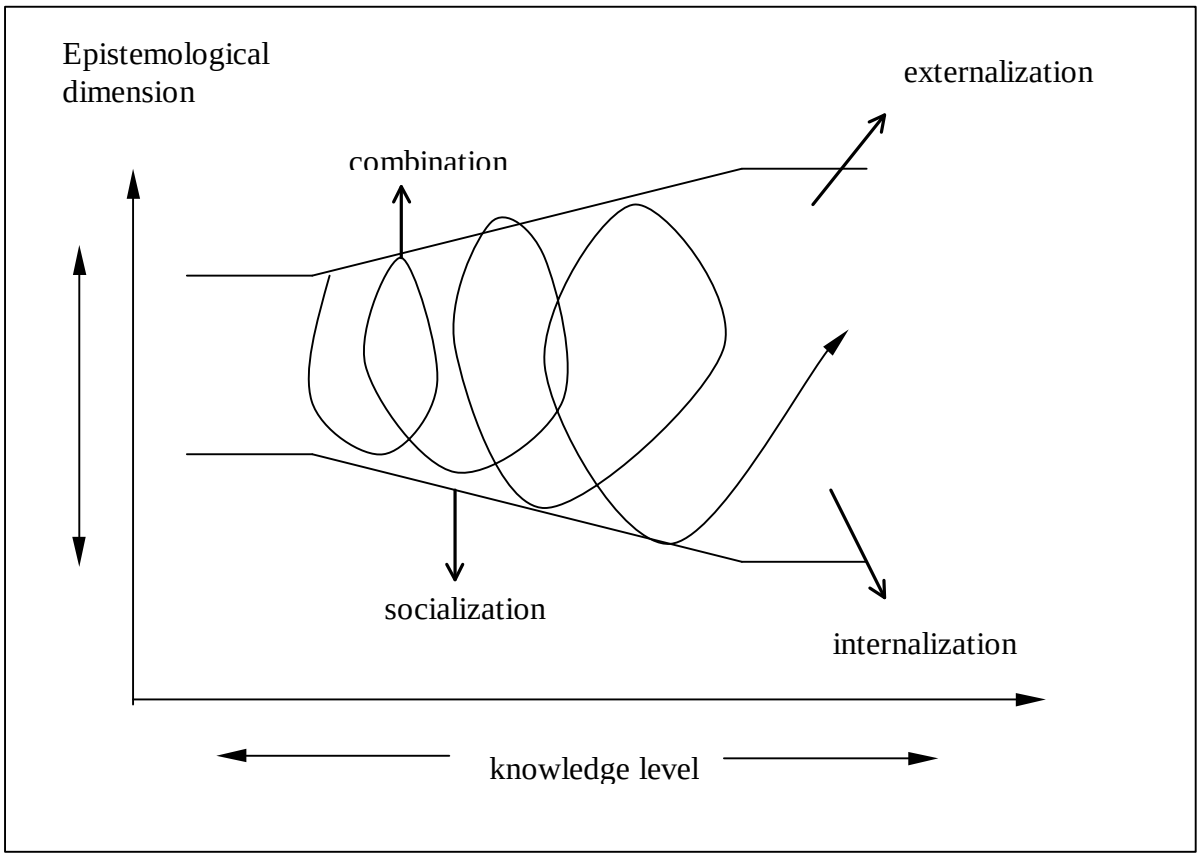


Figure 5.2 Organizational knowledge creation according to Nonaka (1994)

In figure 5.2, organizational knowledge is created by a continous interaction between the four forms of knowledge creation. A continous cycle of knowledge is created which uses different forms of knowledge creation at different times.

For example, the cycle might begin with a phase of socialization through team-building where the perspectives and experiences of the organizational members is exchanged. Thereafter a phase of externalization might be spurred through a meaningful dialog, for example with the use of metaphors between the individuals. Through an iterative process of "trial and error" knowledge can be articulated, formulated and concreticized leading to internalization through "learning by doing" in a third phase. Participants in the group share explicit

knowledge which gradually, through interaction between the individuals, is transferred to tacit knowledge.

Of this follows that tacit knowledge can be created by an interaction between the four forms of knowledge creation. According to Nonaka (1994), this interaction tends to be more large-scale and quicker the more individuals which are involved and the larger part of the organization which is influenced. In this way organizational knowledge management can be viewed as a progressing spiral in an organization which starts at the individual level and progress to an organizational, sometimes even interorganizational level.

A very important aspect regarding organizational knowledge creation and the fulfillment of this creation is, according to Nonaka (1994), how knowledge practically can be transferred from the individual to the organizational level. The individual is the primary unit in the knowledge creation of organizations and the knowledge which the individuall possesses is to a large extent tacit. The quality of this tacit knowledge is dependent on two main factors according to the author, - the variation in the individual´s experience and what Nonaka terms "knowledge about experience".

The first factor, the variation in the individual´s experience, is to a large degree dependent on the degree of routine in the operations the knowledge refers to. If the degree of routine has been high, the knowledge received will decrease over time. This is due to the fact that the carrying out of routine operations does not facilitate creative thinking and the creation of new knowledge.

However, just increasing the level of fluctuation and non-routine in tasks and operations is not enough for increasing the quality level of the tacit knowledge which is received. This is so, since it is difficult to integrate experiences and draw conclusions on basis of several sources of experience if the individual finds his or her experiences unrelated.

Regarding knowledge about experience Nonaka means that this stands for the embodyment of knowledge through a personal engagement which makes the individual receive a kind of physical experience. This factor, which sometimes is referred to as "experiencism", refers to both doing and experience and downplay the role of reflection and logical thinking. According to the author this factor tends to overemphasize the importance of doing, and underestimate the search for more general conclusions which can be applied in more areas than the researched area.

Concerning the quality of explicit knowledge, the author stresses what he terms "knowledge about rationality". This factor can be viewed as an opposite factor relative to the two factors already described. Knowledge about rationality

describes a rational ability to draw conclusions from experiences and focuses on the combinatory aspects of knowledge transfer. This factor is effective for the creation of digital, declarative knowledge. However, according to the author, it tends to ignore the importance of engagement and instead focuses on a reinterpretation of existing explicit knowledge.

How then should organizational knowledge creation be facilitated practically? Nonaka (1994) argues for the use of what he calls the creation of "fields" and "self-organized teams".

A self-organized team is a team where the members can work and cooperate in order to create new knowledge and where they can interact freely with each other and thereby share individual experiences and tacit knowledge. In this context, it is of great importance to build in a certain level of flexibility in the system surrounding the self-organized team so that a diversity of ideas and thinking can be secured.

When setting up self-organized teams it is important to give the team a field which becomes a basis for resolutions of conflicts and where individual members in the team can express personal opinions and views. In companies such fields often exist in the form om functional units or departments, for example, marketing departments and departments for supplies. The field becomes a sort of smallest common basis for interaction and communication between the members of the team.

Apart from self-organized teams and fields, Nonaka (1994) regards the rythm of the interaction as important for the knowledge creating process. Within the team, different interaction rhytms co-exist in the beginning and are amplified to a certain degree, then these rhytms converge towards a concept. As a concequence of this, it is according to the author, a critical task of the team-leader to try to balance interaction rhytms that diverge and converge to a process which results in dialog and shared experiences.

The definition of knowledge by Nonaka (1994) as "justified true belief" originates from this view of interaction rythms and their role in the creation of knowledge. This justification is the process of final convergence of interaction rythms that comes in the end of a knowledge creation phase. This convergence determines the degree to which the knowledge created in the organization can be of use for the organization and for society at large.

5.2.2 Miller´s (1996) theoretical framework

According to Miller (1996), it is possible to identify two major contrasts among major organizational paradigms used to construct a typology of organizational learning. These two contrast pairs are voluntarism vs. determinism, and methodical vs. emergent behavior.

According to the author, the contrast between voluntarism vs. determinism meassures the extent to which people and their institutions are regarded as intelligent and autonomous actors in knowledge making rather than entities which are severely restricted in their action and cognition. Depending on the relative level of focus on these two paradigms, important differences concerning the way organization can learn are distinguished.

On the one hand, some research stress a relatively unconstrained kind of learning. For example, Ansoff (1984) mean that global analyses which are performed by people high in organizational hierarchies constitute a relatively unconstrained kind of learning. On the other hand, however, some researchers (e.g. Cyert & March, 1963 and Nelson & Winter, 1982) view learning in organizations as a more incremental process , for example in the form of small modifications of existing methods or through feedback when excercising existing routines. This research takes a different view of the concept where the learning is seen as a more constrained process.

Another dimension on which theories of organizations can be contrasted concerns what Miller (1996) calls methodical vs. emergent behavior. Here, the focus is on whether the decisions in the organization are based on methodical analyses and concrete standards or if they are the result of emergent intuitions and more subtle values.

In this regard, it is possible to see large differences between research on, for example international economics (e.g. Porter, 1980) and institutional theory (e.g. DiMaggio & Powell, 1991). Reserch in the former category regard managers as intendedly rational individuals who make decisions after a systematic analysis of information. Reserchers in the latter category, on the other hand, stress spontaneity and emergent behavior in the decision process.

As in the case of voluntarism vs. determinism, these differences in views are reflected in clear differences regarding the view of organizational learning. Examples of methodical learning which Miller (1996) mentions, are analyses of competitive markets and the use of statistical quality control procedures. Emergent learning is examplified by insights that give executives new visions and social interchanges managers have which provide learning possibilities.

On basis of the discussion and categorization of previous research into the two dimensions voluntarism vs. determinism, and methodical vs. emergent behavior, Miller (1996) identifies six kinds of organizational learning. The methodical modes include, in a descending order of voluntarism, analytic, experimental and structural learning. The emergent learning modes, also in a falling order of voluntarism, include synthetic, interactive and institutional learning.

Analytic learning refers to a learning form which emphasize hard intelligence data, deductive logic and numerical calculation. A large part of the gathered information is quantitative and is monitored and checked via formal systems. In this form, learning occurs via intensive and systematic information gathering both from within and from outside the organization. According to Miller (1996), most analytical learning takes place at higher levels of the organization, although the results of the learning may be diffused to lower organizational levels.

Compared to analytic learning, synthetic learning is a learning mode which is less systematic but more emergent. This learning form is more holistic and emphasizes intuition in the learning process. According to the author, synthetic learning often involve hermeneutic processes where organizational streams, such as decisions and events, are interpreted in order to find key patterns, hidden meanings and underlying dynamics.

According to Miller (1996), synthetic learning results from creativity, often from a single individual in the organization. This creativity is shared with other members of the organization, but in similarity with analytical learning, most often the insights from synthetic learning may remain with a couple of managers and only the implications from the learning in the form of decisions, procedures and routines are shared among most of the organization´s members.

An advantage of synthetic learning is, according to the author, that it can summarize information in a manner that disposes of extraneous, unnecessary details and focuses on what is of most importance. Due to synthetic learning, configurations or themes which reveals important parts of problems may be obvious to management and critical resources or competitive advantages can be discovered in this way.

Another advantage of synthetic learning is that it also may result in synergy effects, for example, regarding organizational departments or skills (ibid.).
A related advantage concerns systems thinking due to the fact that synthetic learning can enable managers find dynamics and evolving configurations in the organization. That is, they do not only see how different parts and organizational departments fit together, they are also able to feel how the dynamics of the system works.

So are there only advantages associated with synthetic learning? No, unfortunately effective synthetic learning, according to Miller (1996), often is beyond the intellectual capacity of managers. Also, identified synthetic learning sometimes may be so integrated in the organization that it makes necessary alteration problematic.

In accordance to analytic learning, experimental learning is a rational, methodical approach to how learning can be achieved. In this approach, the objective is to systematically gather and interpret information in order to improve the organization. However, in this learning form, action sometimes comes before analysis in the learning process. Another difference between experimental and analytical learning is a larger focus spontaneity since it is not so managed by detailed planning.

According to the author, experimental learning often occur when an organization tries to renewal or adapt, since this form of learning tend to occur when efforts are made to improve product lines and production methods. According to Hart (1992), this kind of learning behaviour tend to occur at many levels in organizations and this learning form is not necessariry most used by top managers.

However, even if participation in experimental learning more often occur at more levels in the organization than analytical learning, what is learned might be used only locally in the organization. Therefore, experimental learning more probably leads to situational, local, tactics than the production of organization-wide strategies.

A strength of experimentation is, according to Miller (1996), that it tends to limit risks and since it tends to occur at all levels of organizations, it also may exploit learning possibilities effectively throughout the whole organization.

The disadvantage of this learning form might be, as mentioned, that it often results in local knowledge which is more fragmented. Therefore it might be more difficult to integrate knowledge derived from this form of learning throughout the organization than it would be for most of the other learning modes (ibid.). This can be an important disadvantage, since the organization can have different subgroups which pulls in different directions.

In similarity to experimental learning, the interactive learning form emphasizes learning-by-doing. However, this learning-by-doing differs from the experimental learning form in that the individuals learn in a more emergent and implicit way instead of systematically experimenting with routines and practices. Learning, to a large extent, occurs through an exchange of information that can reveal the

underlying workings of phenomena and the motives of rivals and allies within the organization or outside it.

Interactive learning focuses on "reading people" and the objective to learn about the environment through intuition and instinct. This kind of learning, according to the author, typically occurs within smaller subgroups of the organization and the learning results often have only local effects. However, it should be emphasized that when used collectively, the outcomes from this kind of learning in the form of agreements, etc. can have a large influence on the evolutionary path of the organization as a whole.

According to Miller (1996), an advantage of interactive learning is the possibilities of a fostering of a more realistic collaboration between individuals through the form of an exchange of information. However, an important disadvantage is found in the risk of political opportunism which may be emphasized in favour of the carrying out of global objectives of the organization.

By structural learning, Miller (1996), refers to organizational routines which may improve learning in the organization in different ways. First, they specifiy methods which can be used in order to improve efficiency or correcting errors. This can lead to "programmed learning" since the routines normally describe standards and ways of doing things which help in ensuring reliable performance. Second, the use of routines may help in controlling what information managers receive and how they will view that information. Due to this, consistency in thought and action can be achieved (Clegg, 1989).

Routines are more likely to lead to learning that refines practices which already exist rather than help in discover new ones (Argyris & Schon, 1978). This is due to the fact that routines focus on habit and redundancy and they constrain the range of experiences.

However, the structural learning approach of using routines may also lead to dysfunctions such as alienation from work and inertia in changing ways of doing things (Perrow, 1986). Since routines may lead people to do things in certain ways without reflecting about why and how they do them, routines can make an organization slow in adapting to new circumstances and new environmental influences which call for changes in the way tasks are carried out.

The final learning form Miller (1996) describes is termed institutional learning. This refers to the emergent and inductive organizational process in which values and practices are assimilated from the environment or from the people of the organization.

This kind of learning affects many members of the organization and knowledge obtained is diffused widely in the organization. According to Miller (1996), it is often the members high up in the orgnaizational hierarchy who influence the larger number of organizational members of lower rang in the organization. Due to this, an important dysfunction related to this learning form is the risk of negative indoctrination leading to groupthink. However, the indoctrination does not necessarily have to be bad, it can also create a basis for coherence among the members of the organization, facilitating group work (Whitley, 1991).

Miller (1996) summarizes the differences between the six identified learning modes into table 5.1.

Table 5.1 The six learning modes according to Miller (1996)

	Analytic learning	**Synthetic learning**	**Experimental learning**	**Interactive learning**	**Structural learning**	**Institutional learning**
Dominant learning devices	Scanning Analysis	Hermeneutics Insights	Action Testing	Negotiation Accomodation	Routines	Indoctrination Ritual
Search and analysis	Thorough	Intuitive	Spontaneous Proactive	Reactive Local	Programmed	Not done
Choice	Calculated	Aesthetic	Feedback-based	Political	Automatic	Value-driven
Typical goal	Optimization	Synergy	Innovation Adaptation	Satisficing	Reliability	Coherence
What may be learned	Context strategy plans	Subtext configuration system	Paths of renewal	Opportunities and constraints	Procedure refinements	Mission protocol values

5.2.3 Single- and double-loop learning

A distinction regarding learning which is made by many researchers (see, for example, Senge 1990 and Morgan 1986) but which originates from the work by

Argyris (1993, 1996) is the categorization of learning into single- and double-loop learning.

Single-loop learning refers to the kind of learning which happens within an established framework of accepted, customary assumptions. Double-loop learning, on the other hand, refers to such learning where the assumptions and shared views are questioned in order to solve problems.

According to Morgan (1986), single-loop learning "rests in an ability to detect and correct errors in relation to a given set of operating norms" (p. 88). Double-loop learning "depends on being able to take a 'double look' at the situation by questioning the relevance of operating norms" (ibid). Morgan´s (1986) view of the two terms is conceptualized in figure 5.3 on the next page.

Double-loop learning is needed in fast-changing environments due to the importance of finding new strategies for coping with new situations. Simply using single-loop learning cannot accomplish this end. Argyris (1996) warns for the belief that organizations with successful single-loop learning can make up for a deficit of double-loop learning. The danger, according to Argyris, lies in the risk of developing taboos regarding criticizing existing norms and standards in the organization (cf. groupthink in section 3.2.2). As long as the organizational members are afraid of mentioning basic problems concerning principles, structures and norms, their knowledge of the fact that all is not well in the organization may lead to an even larger focus on single-loop learning. However, this solution is close at hand since single-learning improvements are easy to produce due to the established norms and structures. The real, serious problem in these situations cannot be adressed due to these structures which are taken as given.

5.2.4 Discussion

Although the two research works on organizational knowledge creation in the form of the frameworks by Nonaka (1994) and Miller (1996) both deal with how learning takes place in organizations they differ in analysis.

Nonaka (1994), presents a whole new theory where organizational knowledge creation is viewed as an interaction between four identified forms for knowledge creation, building on the concepts of tacit and explicit knowledge. Miller (1996), on the other hand, simply categorizes other research on organizational learning and says very little about how learning takes place and how the learning process should be facilitated in practical terms. Concerning the latter, Nonaka (1994) presents his theories on what he calls "fields" and "self-organizing teams".

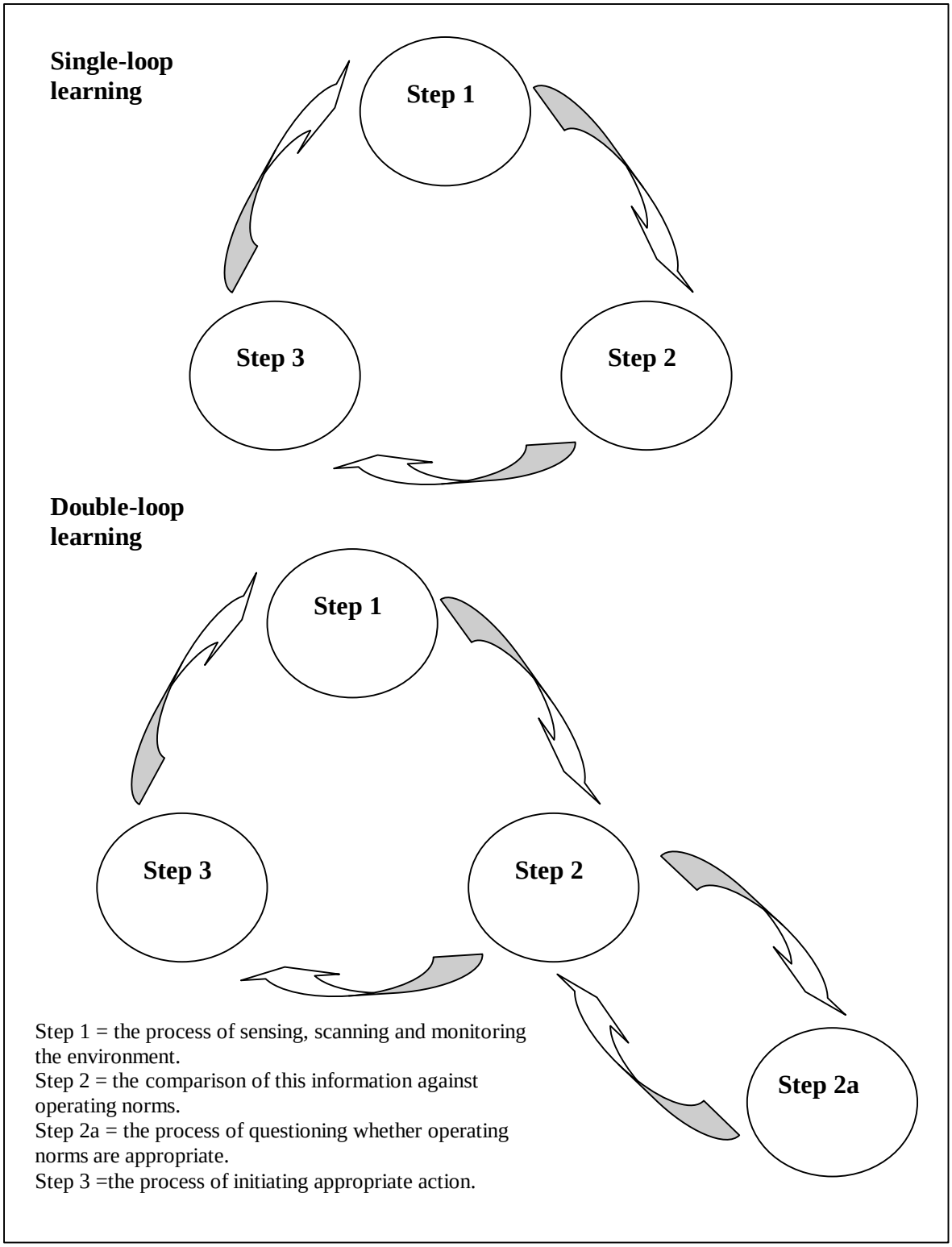


Figure 5.3 Single- and double-loop learning (Morgan, 1986)

5.3 Organizational memory

As mentioned, organizational memory refers to "a repository for collective insights contained within policies, procedures, routines, and rules that can be retrieved when needed" (Day, 1994). The question now is, how can this repository be accomplished?

In section 5.3.1, a model used to facilitate learning by documenting and preserving instances and tasks proposed by Linger & Burstein (1998) is presented. This is followed by a presentation of the model of organizational memory system data structure proposed by Agahi (1999) in section 5.3.2. Finally, in section 5.3.3. a discussion on the presented theories is given.

5.3.1 Linger´s & Burstein´s (1998) theoretical framework

According to Linger & Burstein (1998), a change in the emphasis from memory regarded as a repository to processes of remembering and forgetting reveal new aspects of organizational memory and the construction of organizational memory systems (OMS). According to the authors, this focus on processes is critical for an understanding of who will use an OMS and why they will use it.

Linger & Burstein (1998), mean that this focus on organizational memory is needed in modern organizations of today where workers have more responsibility and decision power, team-work is becoming more and more popular and the members of the organization are encouraged to be creative and innovative. Therefore, organizational memory cannot simply be considered as a means of saving hard facts and figures in computer based memories which the organization is afraid of loosing in case of high labour turn-over.

In order to develop efficient organizational memory systems which support reflection among the members of the organization it is important that the system support double as well as single loop learning. According to the authors, the view of organizational memory as simply a repository of knowledge supports single learning in the organization in that this allows for a process of error detection and correction. However, it is the detection and correction of errors in the organization which involve a modification of underlying norms and procedures, - double loop learning, which is most important to support in a modern organization.

In Linger´s & Burstein´s (1998) opinion, actors need to be an integral part in the construction of an organizational memory system. This is because the organizational memory is going to provide a history of the activities and since it

will document aspects of things which before were the internal inscriptions of the organization´s members. Therefore, the OMS must maintain multiple viewpoints of the issue to be documented in order to support each individual actor and support the creation of a history for each activity. The organizational memory system thereafter has to support processes which use these individual viewpoints to construct an organizational view of the activity about which there is concensus in the organization and diffuse this view among the organizational members.

Based on the authors opinions on organizational memory and how an organizational memory ought to be and what it is supposed to support, Linger & Burstein (1998), propose a framework for how individual, organizational, single- and double-loop learning can be supported and integrated in an organization with the use of an organizational memory (see figure 5.4). In the model proposed by the authors, organizational memory includes what the authors call the specific domain model (SDM) as well as the general domain model (GDM).

The SDM contains "the conceptual models of individual episodes of the task" (Linger & Burstein, 1998) and the GDM refers to "conceptual models of organisational views of the performance of the task" (ibid.). The SDM and GDM both represent memories that encode organizational knowledge. This can be contrasted to the task which holds transactional data which can be referred to the particular episode of the activity. The two memories in the model each store several models which represent the evolutionary history of each memory as well as multiple viewpoints of individual organizational members.

According to the authors, the two learning frames in the model need to be considered as recursive and due to this, the language used in the model is important. Since a large part of the knowledge which are to be remembered are in form which is difficult to express, - tacit knowledge, it is important to agree upon the communication of this knowledge by all involved in the specific activity. Without such an agreement, the inscriptions in the SDM and GDM do not convey the encoded knowledge and therefore cannot support remembering in any efficient way.

Recursiveness is also focused upon due to an enabling of both the separation and integration of task performance in the form of, for example, reflection and experimentation. The specific domain model represents an abstraction of a task which can be used in order to inform and support a performing actor directly. In turn, the SDM itself is the basis from which the GDM is abstracted.

In the model, the abstractions form a learning loop which completion is represented by the downward arrows. These represent knowledge processing, i.e. processes that can facilitate insights which are gained by performing a task to

validate the organizational knowledge which is represented by the SDM and GDM in the model. According to Linger & Burstein (1998), the abstractions of knowledge, informing practices and recursiveness in the model eliminates the need of any specific maintenance process since all involved models are continously evaluated.

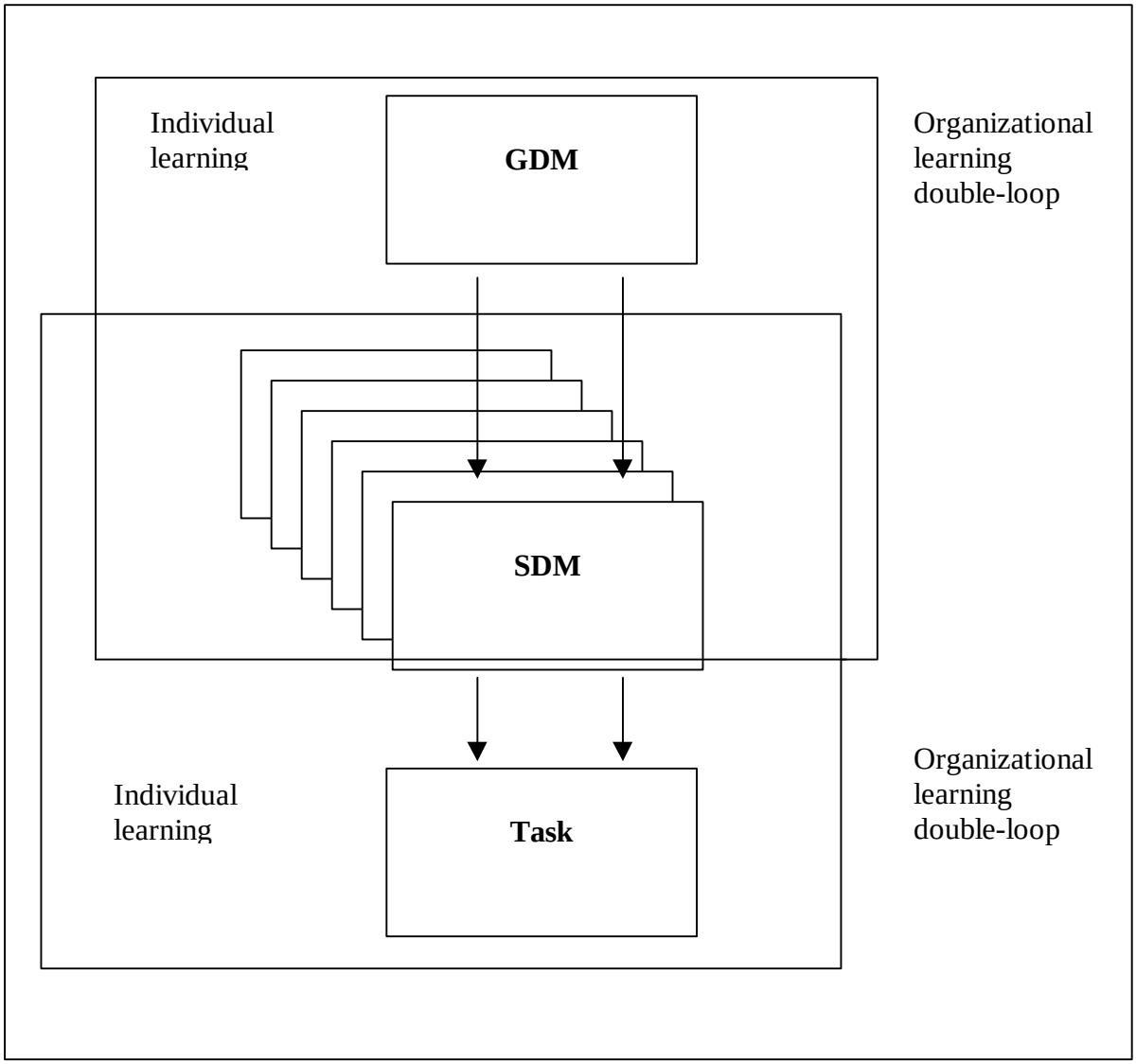


Figure 5.4 Single- and double-loop learning (Linger & Burstein 1998)

5.3.2 Agahi´s (1999) theoretical framework

According to Agahi (1999), decision making and consultation in groups might suffer of inefficiency due to two major reasons, - human factors such as

groupthink, group polarization and dominance, and technical factors such as an unability to memorize or make created knowledge available to the decision makers.

In Agahi´s view, concentration in the decision group should be turned to the decision problems and decision knowledge should be structured and "displayed" to the decision makers in order to try to overcome the inefficiencies associated with group decision making.

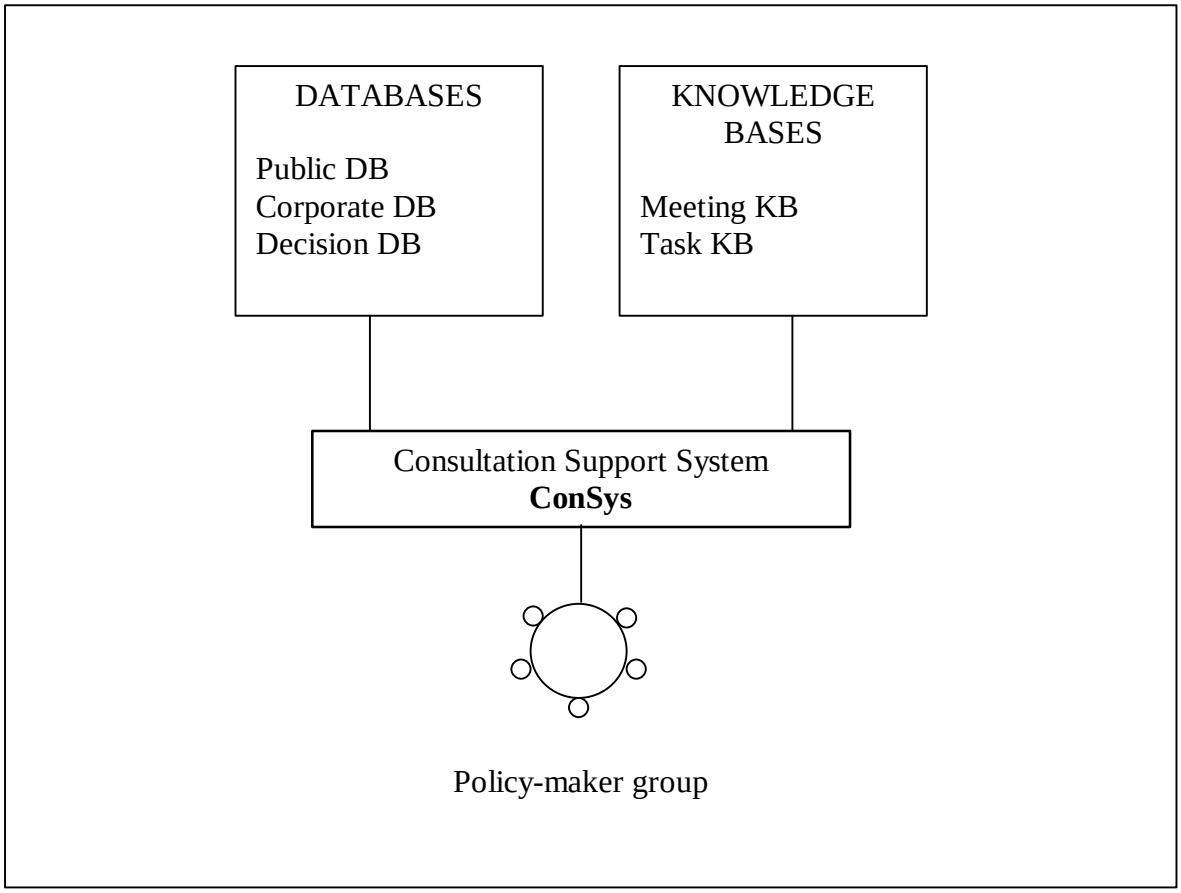


Figure 5.5 The ConSys-model (Agahi, 1999)

By focusing more on the decision problems by structuring these and make previously gained knowledge more easily available, the decision makers can become less confirmation biased, better participants and collaborators. With more structured knowledge, it is easier to put a decision problem in its proper context and communicate about it. Structuring also makes it easier for decision makers to think more systematically since the structuring gives them a better overview and understanding of the problem elements and their interrelationships.

If the principle "the group's decision, at the moment and until a new decision, is the best solution" is accepted, Agahi regards the appropriate decision support approach to be active information to the group of decision makers of the progress of a decision, what has been decided and why. According to Agahi (1999), by making "decisions' content and outcome explicit, inconsistencies and biases, as well as questionable content of arguments, can be subjected to critical reflection by group members and colleagues".

On basis of the above discussion, Agahi presents ConSys (see figure 5.5 on the previous page) which is a consultation system surrounded by an ODSS. The consultation system will function as a repository for decision knowledge with the purpose of drawing the decision makers´ attention to important factors in the decision making process which otherwise might be overlooked. The system also will accumulate decision makers´ initiatives in the decision making process and store the decisions of general character in a knowledge-base system.

Central in Agahi´s ConSys-model is the structuring module. This module captures the most central and important features of a decision into a "decision card" (see figure 5.6 below) where key issues, backgrounds to the made decision, outcomes and relations to other related decisions are documented.

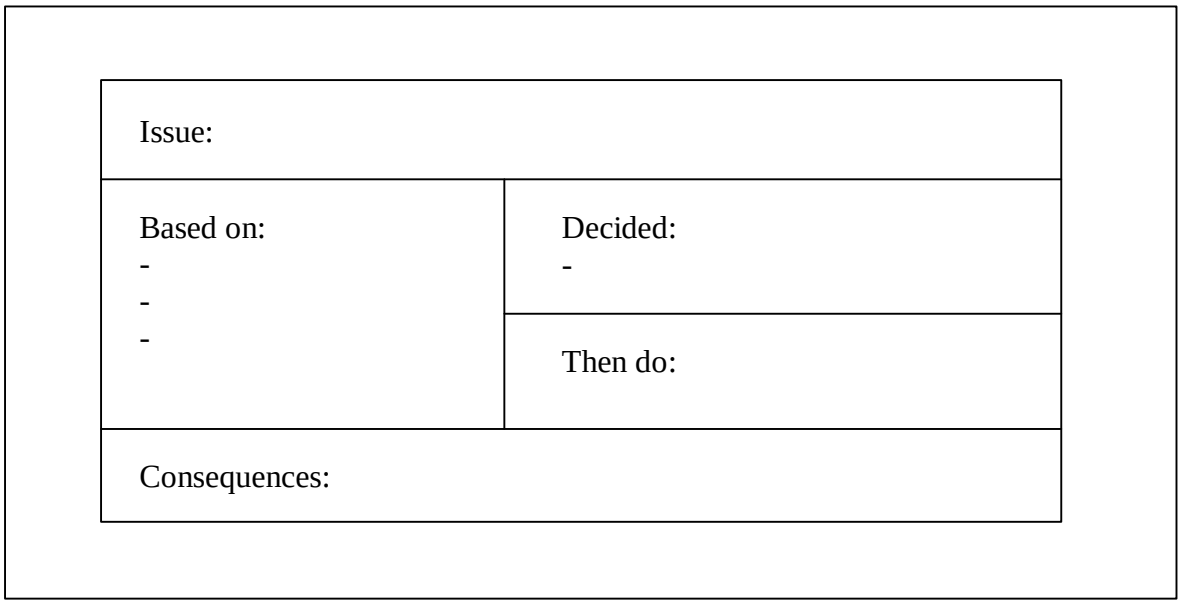


Figure 5.6 The model of organizational memory system data structure (Agahi, 1999)

Also, consequences and experiences associated with the decision can be included in the module and issues can be categorized according to a tree-structure. In addition, Agahi (1999) points out, that the summarized information

contained in the structuring module can refer som more extensive information material and systems in the form of hypertext links.

5.3.3 Discussion

Although the research work by Linger & Burstein (1998) on the one hand and Agahi (1999) on the other differs regarding approach there is an important similarity in that they both stress the need to create an organizational view formed in consensus of the activities which are to be memorized in the organisation. Agahi (1999) however, also present a practical way in which this end could be achieved in the form of the "decision card", - the model of organizational memory system data structure.

Linger & Burstein (1998), argue that the organizational memory must contain a history in the form of multiple viewpoints of the activities which are to be documented in order to support each individual actor and support the creation of a history for each activity. However, we see a risk here that the discussion which was held before the decision was taken might be used as a basis from which people are blamed depending on the actual result of the decision. If, for example, a person who were for a decision which did not turn out positively later is blamed for this, (referring to the the discussion held before the decision) he or she may feel reluctant to contribute with opinions regarding new issues due to the risk of being blamed if the opinions do not turn out to be good.

In order to get to grips with this risk of passivity, we therefore suggest that such a history of the decisions should be anonymized after a decision has been taken so that not only the decision but also the discussions before the decision can be regarded as a result of the whole organization and not of single decision makers in cooperation.

6. Theoretical Frame of Reference: Means of Communication in Group Decision Support Systems and Knowledge Management

In this chapter, the third and final chapter in the theoretical frame of reference, more technical issues regarding decision support and knowledge management are presented and discussed. More specifically, common tools and techniques used in support of group decision making and knowledge management contexts as well as their pros and cons are presented. This chapter correspond to purpose three, - To examine theories on means of communication techniques which can support organizational decision making.

Our intention with this chapter is to give the reader a short introduction to possible technical solutions which can be used in the contexts mentioned. Since this area is large and the solutions are many, we have chosen to describe only the most common techniques available and with a focus on web-based techniques due to the fact that our own application prototype is developed in such an environment and due to the increasing use of the Internet as a platform for decision support and knowledge management.

6.1 Data Communication

In section 6.1.1 a short introduction to the client/server model of computing is presented. This section is followed by a presentation of the Internet in section 6.1.2.

6.1.1 The client/server model of computing

Most groupware and workflow systems today conform to what is usually termed the client/server model of computing (Chaffey, 1998). This form of computing involves a series of clients, usually in the form of desktop PCs, which are connected to a server computer via a local-area network (LAN) or wide-area network (WAN). A server is a component in the system that manages or controls particular system resources and makes those resources available to other system components, the latter are collectively known as the clients which the server serves.

The networks can be of different types depending on topology and technologies involved. Common network topologies are so called star-, ring- and bus networks

(Ewert, 1998). Important benefits associated with the client/server model of computing are cost savings in the form of shared resources (printers, memory, etc.), increased possibilities of sharing data and improved communication possibilities (Chaffey, 1998).

There are many alternative ways in which client/server can be deployed. The distribution of processing and data can, for example, be focused more towards the server or more towards the client. Depending on the chosen strategy in this regard, the clients often are categorized as "thin" (very little processing and handling of data at the client, much at the server) or "fat" (very little processing and handling of data at the server, much at the client).

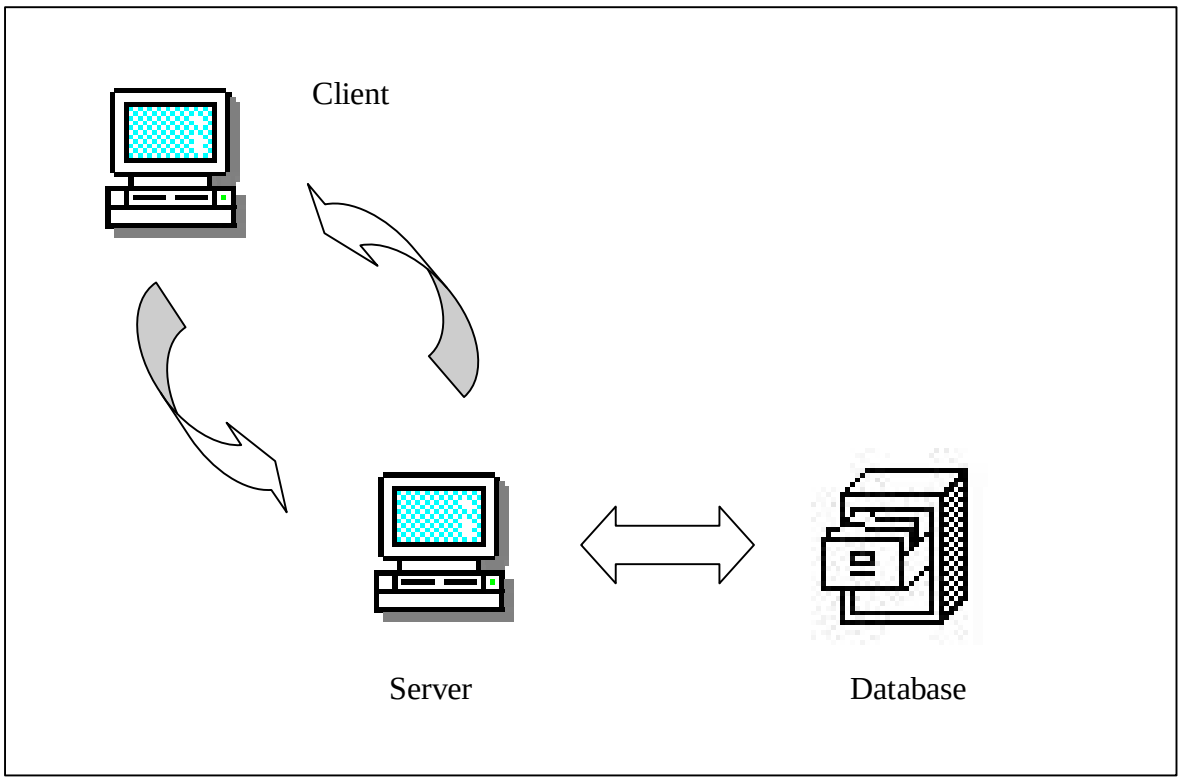


Figure 6.1 A basic scheme of a client/server relationship

6.1.2 The Internet

The Internet is a large-scale development of the client/server model which consists of an infrastructure of servers and communication links in order to hold and transport a huge amount of information between them. By definition, the Internet is not one single network, but a connection of several networks of

different sizes which have been connected into a larger heterogenous, global network.

The Internet started as the ARPAnet network in the United States around 1969. This network linked servers which were used by important military and academic institutions at the time of the cold war. An example of an illustration of the different sorts of networks connected by so called routers and switches (relay points that steer the traffic) that the Internet consists of, is given in figure 6.2 below.

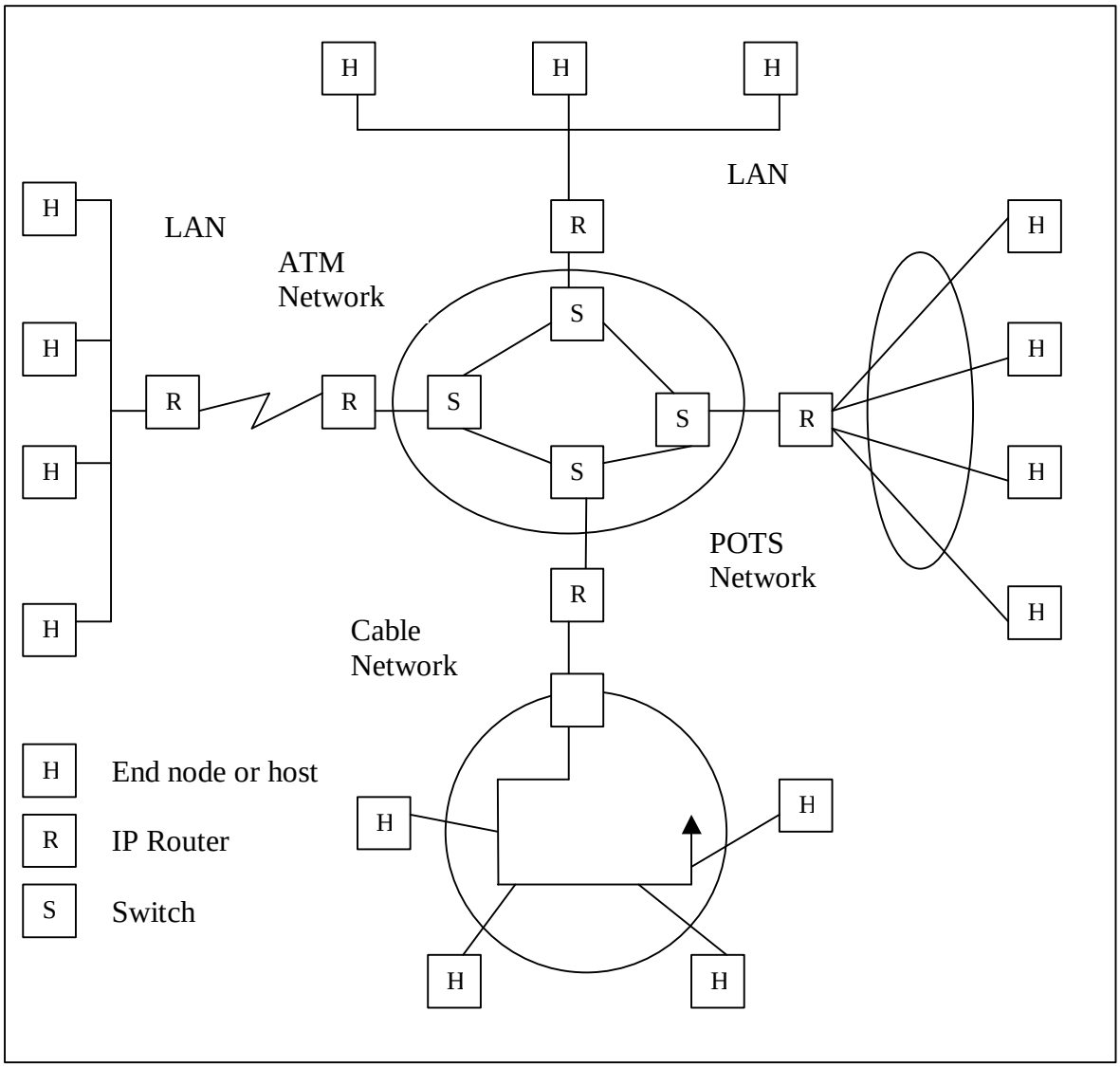


Figure 6.2 Conceptual model of the Internet (Clark, 1999)

The popularity and number of users of the Internet is growing steadily, at almost an exponential rate. According to Ewert (1998), the number of stations connected to the network in 1996 exceeded 10 milliion. That number is double the number for the beginning of 1995.

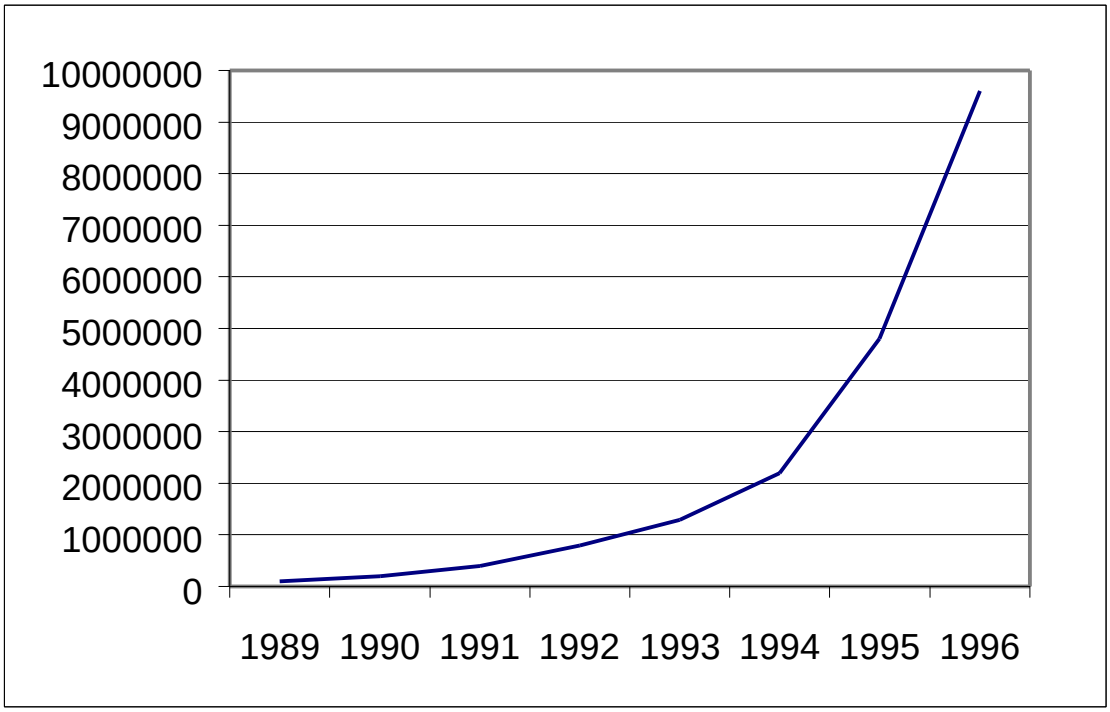


Figure 6.3 Number of connected workstations to the Internet (Ewert, 1998)

6.2 Web technologies

As mentioned, there are two available strategies regarding the distribution of processing and data in a client/server network, - using thin or fat clients. Since the Internet as a matter of fact is a large client/server network these strategies are applicable here as well. In the following, these two general strategies and their implications for systems development on the Internet are examined.

In section 6.2.1, web technologies using thin clients, such as common gateway interface (CGI) and Java Servlets are presented. This presentation is followed in section 6.2.2 by a similar presentation regarding fat client technologies such as Java Applets and JavaScript. In section 6.2.3, more general web communication techniques such as e-mail, and icq are presented. Finally, in section 6.2.4,

wireless, mobile communication techniques such sms and wap/pda are presented.

6.2.1 Thin client web technologies

CGI

One of the most common thin client techniques used on the Internet is the common gateway interface, CGI. In a nutshell, a CGI is just a program which runs on the server. The program can be written in any programming language, as long as it is possible to run it on a server. It is important to note that CGI is not a programming language in itself, - many different programming languages can be used in order to create CGIs. One of the most commonly used programming languages in this regard is PERL (Frykholm, 1997). A model of how a CGI works is given in figure 6.4.

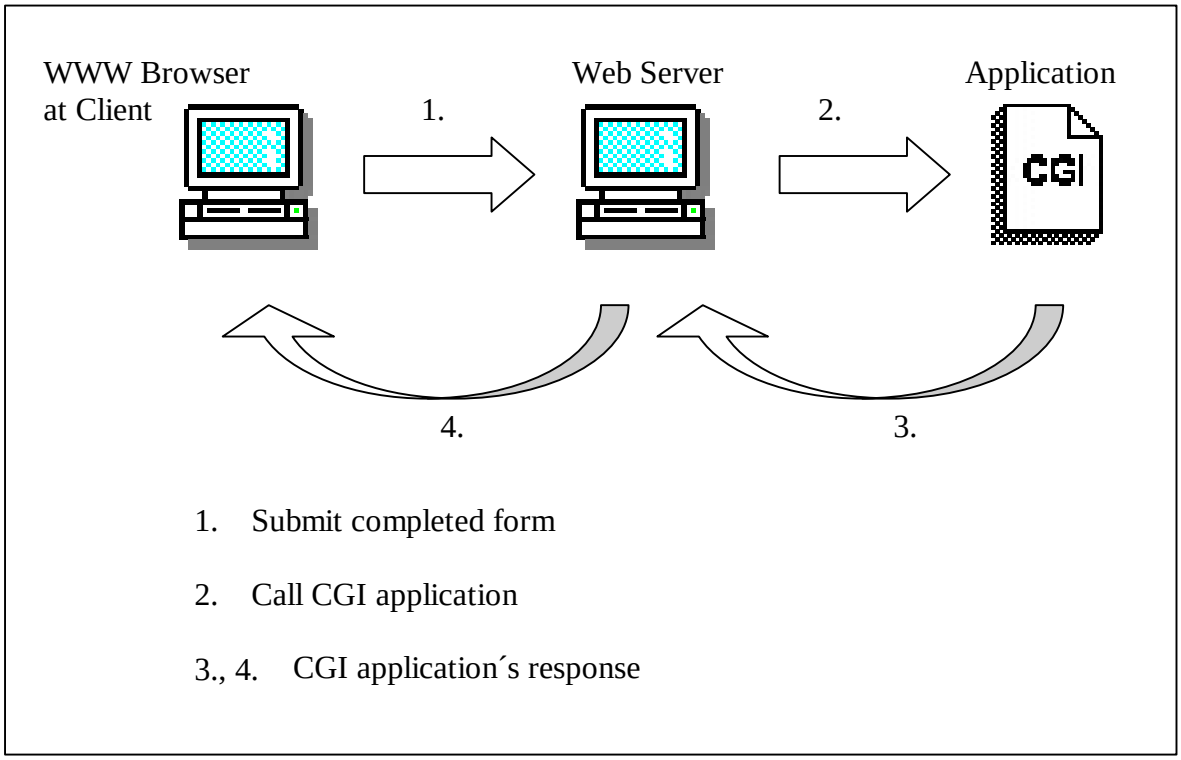


Figure 6.4 A simple model of CGI (Gundavaram, 1996)

There are many advantages associated with using CGI as a basis for constructing systems on the Internet. First, it is possible to include HTML directly

in the code which makes it very easy to implement different layouts of programs without changing too much code. Second, CGI programs using the power of regular expressions in Perl are very well suited for text processing tasks such as string comparisons and validitation as well as searches and replacements of text. Other advantages are that the CGI technique is essentially consistent and therefore is truly platform independent. Also, using the technique makes it easy to communicate with many different kinds of applications-databases (Hilal, 1998).

There are however also a few disadvantages associated with the common gateway interface approach for constructing programs on the Internet. One of these regards the significant load on the server that CGI means. Each CGI request makes the server open up a new application run to process the query. After the query has been processed, the result must be sent back to the user and the application must be terminated.

A related disadvantage relates to the situation when a large number of CGI requests to the server occurs. Then the server constantly must start and stop applications which might lead to large delays for the user.

ASP

Microsofts "answer" to the CGI-technique is called Active Server Pages (ASP). Like CGI, ASP consists of an HTML page that includes one or more small scripts which are sent to a Microsoft Web server where they are processed and thereafter sent back to the user.

Although ASP is a feature of the Microsoft Internet Information Server (IIS) it cannot be as easily implemented as CGI which can run on more platforms. However, since the ASP scripts which are run on the server is building on regular HTML, it can be delivered to almost any browser that the client is using. ASP is mainly used for server applications and Microsoft recommends the use of server-side rather than a client-side ASP which actually also is possible. This is due to the fact that scripts implemented on the client side often do not work as intended on older browsers.

VB script (based on Visual Basic) and JScript (based on JavaScript) are the most common scripting technologies used in ASP. As a matter of fact, it is even possible to use PerlScript, - an adapted version of Perl, as scripting language in ASP. A model of how ASP works is depicted in figure 5.5 below.

According to Brown (1999), unlike many of Microsoft's other web editing tools, ASP is browser independent. Another advantage of the programming language, which is due to the fact that ASP was developed by Microsoft, refers to the fact

that it is easy to provide links to the Microsoft databases Access and SQL Server.

A disadvantage of ASP is of course the fact that it must be implemented in a Microsoft environment (whereas CGI, for example, can be implemented on all platforms although with a different level of ease). Another disadvantage relates to security. For example, according to Rekve (1998) "a problem [of ASP] is the ability to

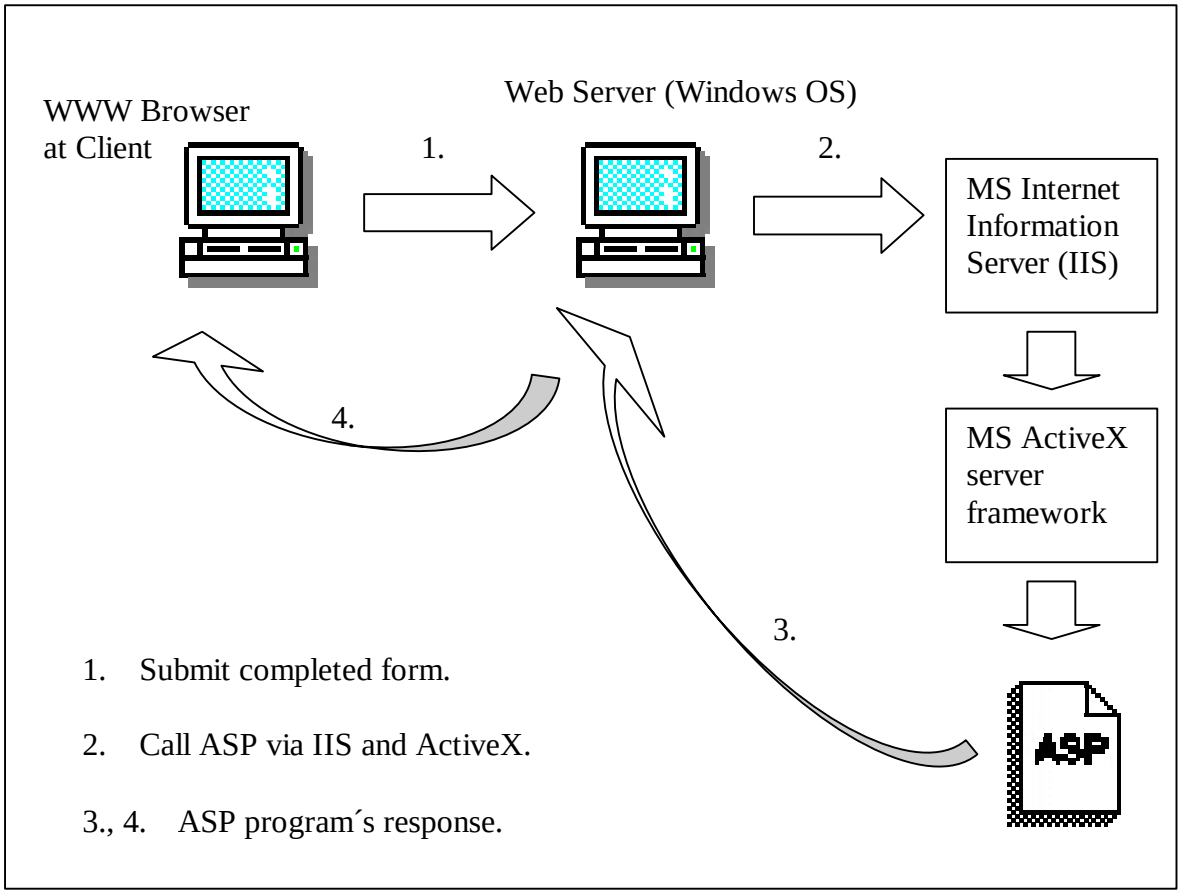


Figure 6.5 A simple model of ASP

download the asp source by appending a '.' to the end of the URL. This allows Web clients to download unprocessed ASP files potentially exposing user ids and passwords".

Java Servlets

Although the use of Java is most dominant on the client-side in the form of Applets (described below under the section dealing with fat client techniques), it is also possible to use the Java technique on the server in the form of Servlets.

Java, which was developed by by James Gosling at Sun Microsystems in the early 1990s was originally called "Oak". In form it resembles C++, but it is purely object-oriented and is said to be platform neutral. Java has all the features represented by C++ but with added capabilities such as automatic garbage collection, multi-threading and no pointers which makes the language easier to learn and handle than C++.

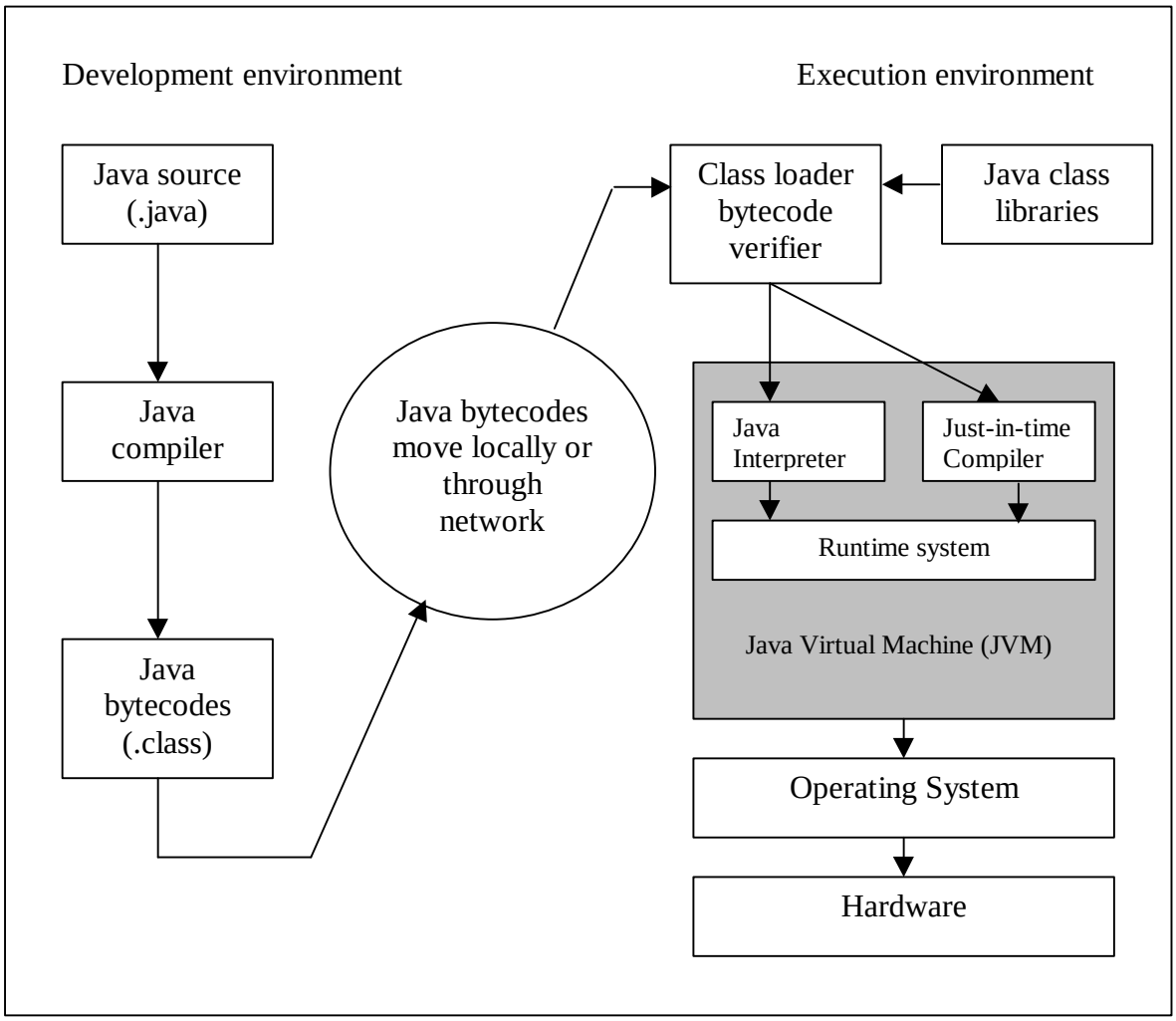


Figure 6.6 A basic model of how Java works (Bayle (1997)

According to Ng (1996), three important advantages with Java are platform independence, extensive application programming interfaces (APIs) and simple syntax. The platform indepence is due to the fact that the Java source code must be compiled into a Java class code before it can be executed. Also, a Java interpreter is needed in order to run the program. Since this interpreter reads thesame Java class code for all platforms where the Java program is executed, only one Java class code is needed. This also means that the class code is portable, in that a system can be developed on one platform and easily exported to another platform without having to recode the application. The model in figure 6.6 gives a summarized picture of how Java functions.

A second advantage with Java is that it has an extensive library of API (application program interface) classes which the developer can take advantage of. Some of these are built into the language itself and can easily be utilized by simply adding an import statement at the beginning of the code document.

These classes therefore give programmers easy to use tools with which they can build their programs and this is of course an advantage compared to languages which which do not come with such additional classes and where the programmers themselves must implement many common functions for graphical user interface (GUI), database connections, etc. The API classes can in this way be compared to the modules in Perl which in a similar way can extend the capabilities of the language. In Perl however, many of the modules do not come with the actual programming language and has to be included afterwards.

A final advantage identified by Ng (1996) regards the simplicity of the language. Java has simplified many of the difficult features in C++ such as pointers and garbage collection. This makes the programming easier but has an associated disadvantage in that it is more difficult to "trim" the programs and make them quicker at execution.

Speed is really one of the main disadvantages of Java. The main reason for the slow speed of programs developed in Java is because the language is interpreted. This makes Java a lot slower than, for example programs written in C since the latter are compiled in native machine language. However, since Java in the form of Servlets, use threads instead of several processes (like CGI) this disadvantage is not as relevant for Servlets as it is for Applets.

Also, the use of multithreading is not as heavy on the server as the use of several processes. This is because servlets only need lightweight thread context switches. CGI, on the other hand, needs heavier weight processes for startup and initialization of code at each request (Kirby, 1999).

A specific disadvantage of Java Servlets compared to other thin client web approaches such as Perl/CGI is, according to Knudsen (1999), that it takes longer time to develop rapid prototypes with Servlets. An example of a simple Servlet is given in figure 6.7 below.

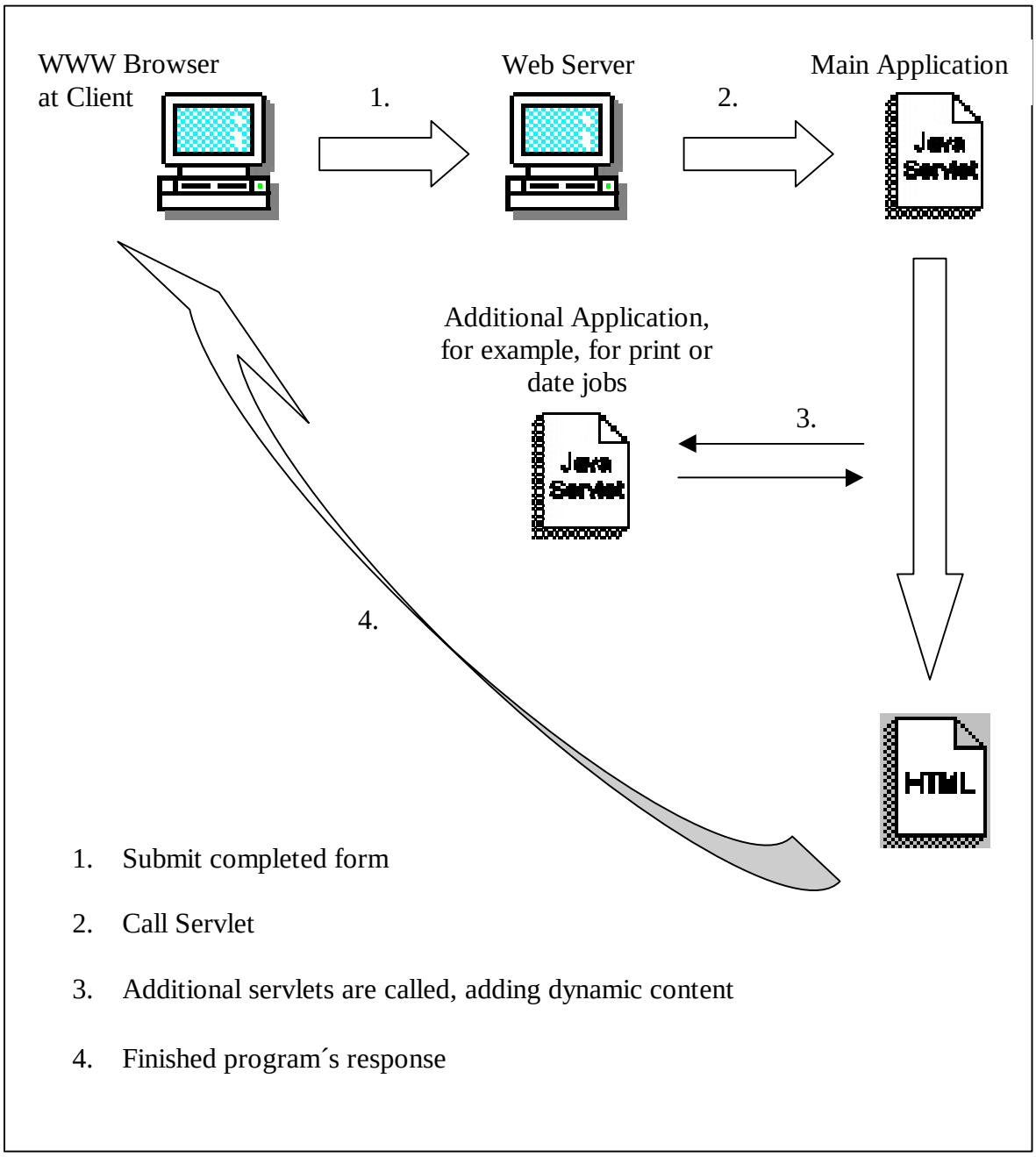


Figure 6.7 A simple model of a Java Servlet

6.2.2 Fat client web technologies

JavaScript

JavaScript was introduced as LiveScript but was later changed by Netscape to the name JavaScript after changes in the language´s fundamental structure. According to Flannagan (1997), JavaScript can be considered as a "lightweight interpreted programming language with rudimentary object-oriented capabilities" which syntactically resembles C, C++ and Java. Although it is possible to run JavaScript on the server as well as on the client, the latter method is by far more common.

According to Flannagan (1997), the real advantage of JavaScript when used on the client side is that the scripts can access a hierarchy of objects that are based on the content of the web page. It is also well suited for "speaking" with Java applets and browser plug-ins on an HTML page. When executed on the client, JavaScript can frequently respond to users very quickly and is therefore it is often a good choice for basic <FORM> input validation since it can execute directly at the time the input is made. Another advantage with JavaScript is that, like Java, it supports automatic garbage collection.

It is important to point out that regardless of the similarity in name and an incomplete syntactic resemblance with Java, the two languages are totally unrelated. However, they are complementary in use and are often used together due to the simple fact that the languages are good at different things. JavaScript is good at controlling and steering the bahaviour of the browser and its content. However, it is not good at drawing graphics and/or performing networking tasks. Java, on the other hand, has no control over the browser as a whole, but is very good at specific tasks requiring graphic skills and multithreading (ibid.).

Apart from the above mentioned disadvantage of JavaScript regarding drawing of graphics and/or networking, a general drawback with JavaScript is that it takes longer than compiled languages to download and execute. Also, since it is possible to write the code directly in the HTML-document, it is very easy for an unauthorized user to access the code unless the code is only referred to in the document and the actual code is located in a hidden directory. This is of course a severe security restraint which it is important to consider when using JavaScript.

Another drawback with this programming language is that it was developed by Netscape alone and therefore lack thorough support by the other dominant browser vendor Microsoft. In order to use JavaScript on the Microsoft Internet Explorer, the user first must enable this function in the browser.

Java Applets

The most common use of Java on the Internet is in the form of Applets which execute in the Java Virtual Machine (JVM) on the client. Java applets are small Java applications (therefore the name ”Applets”) often with a narrowly defined, specific purpose. In accordance to Servlets, Applets use the same general Java technique as is made visualized in figure 6.6 above.

An important advantage with Java Applets relates to interactivity. Apart from other web techniques such as Macromedia Flash which need separate plug-ins in order to work with different browsers, Java, - in the form of Applets, is an alternative in this regard since it does not require any plug-ins in order to work (Ng, 1996).

Another advantage relates to security. The Java interpreter on the client´s web browser checks the applet for any risky instructions as the applet is being loaded. For example, the applet cannot do things as writing files to disc or erase files. The latter is one of the main functions of viruses.

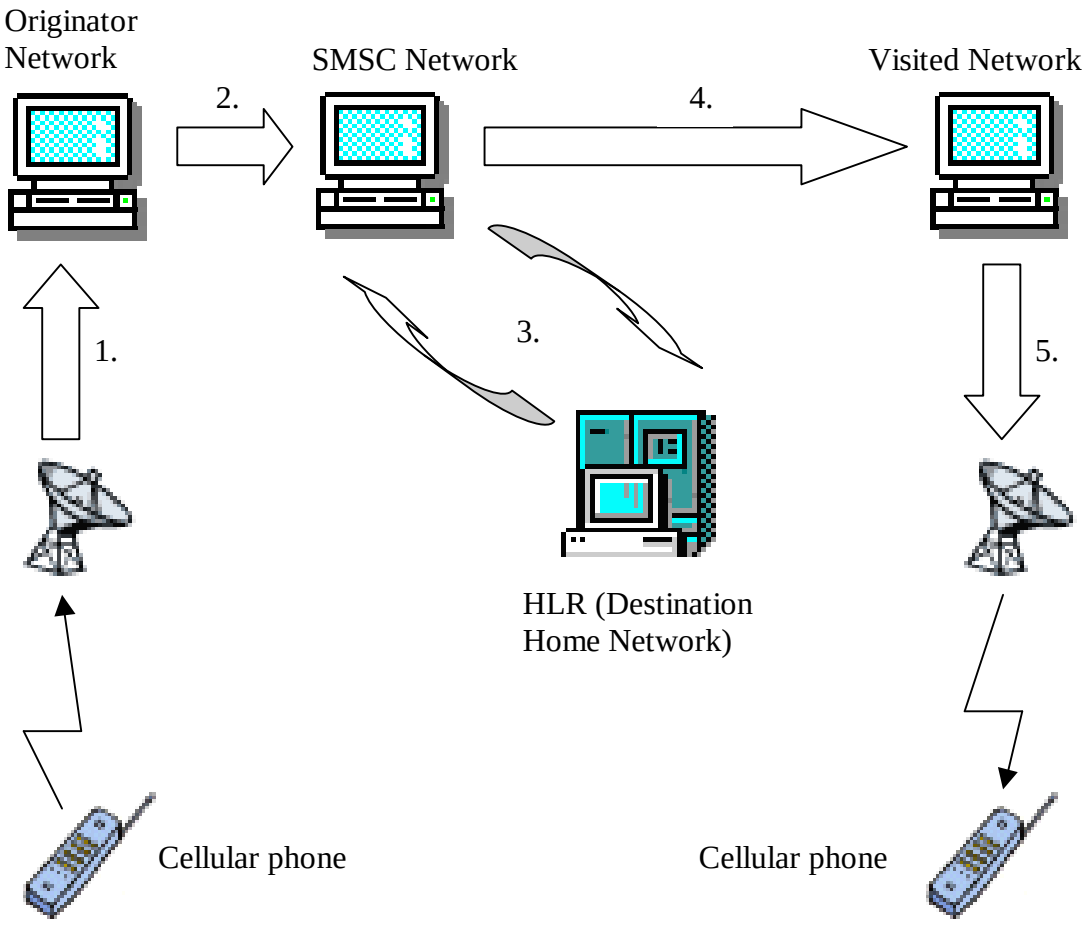
According to Eckel (1998), Applets are in general considered as secure, and since this is very important for trustworthy and reliable client-server systems, any bugs that allow viruses are discovered and repaired quickly. The security advantage is of course also becomes one important disadvantage with Java Applets apart from slow initial download time. Since an applet is restricted in many ways from doing things that are considered risky, it is also difficult to implement such features in systems without having to use rather complex solutions.

Another disadvantage relates to incompatibilities between different web browser versions. For example, the AWT 1.1 (stands for abstract windowing toolkit, - Java´s graphical user interface) event model was introduced only in 4.x browsers. Also, the upgrading of web browsers to the Java 2 specification has been very slow.

6.2.3 Wireless, mobile data communication technologies

SMS

SMS, which stands for short message service, is a text messaging service by which text messages of up to 160 characters can be sent to and from GSM mobile phones connected to a compatible GSM mobile network. Most of these



1. SMS sent to originator network.
2. Message arrives at client´s SMS center (The SMSC generates the special SMS message that notifies the user that he or she has mail waiting in the mailbox).
3. Message is sent to the Home Location Register (provides the administrative information required to authenticate, register and locate the client).
4. Message is delivered to the recipient´s network.
5. Message is delivered to the recipient.

Figure 6.8 A simple model of how SMS works (Holley, 1997)

networks maintain SMS services which can allow their users to send (Mobile Originated - MO) and receive (Mobile Terminated - MT) this kind of messages while roaming on another network (Holley, 1997). How sms works technically is depicted in figure 6.8 on the previous page.

An advantage of the SMS technique is that it is a discreet way of sending and receiving messages. Since the messages are in written form, there is no need of speaking out loud in order to send or receive messages. Another advantage related to the above, is that it is easier to save messages in written form than messages transferred orally between two users of mobile phones. For example, this might be useful when sending codes and other cryptic information between users.

A third advantage of SMS is that it is possible to send SMS messages over the Internet and receive messages in e-mail form. There are also some SMS services available on the Internet which, at this time, is free of charge (for example, Mtnsms at www.mtnsms.com).

An important disadvantage with SMS (which however is not due to the technology in itself) is that it is difficult to write and read the messages on a mobile phone. Often the number buttons on the phone must be used in order to write messages and the messaging display on most mobile phones of today are too small to show the whole message at one time without having to scroll through the message. Finally, the constraint of only using 160 characters in one message makes it impossible to send large messages by using this technical medium.

WAP/PDA

According to the WAP-forum (consisting of over 90 members who have created the WAP) the wireless application protocol, which is what the abbreviation WAP stands for, is "an open, global specification that empowers mobile users with wireless devices to easily access and interact with information and services instantly" (www.wapforum.org).

In essence, the WAP standard is a new advanced, intelligent messaging service for modern digital mobile phones and other mobile terminals, such as personal digital assistants (PDAs) that allow the client to view Internet content in a specially created text format.

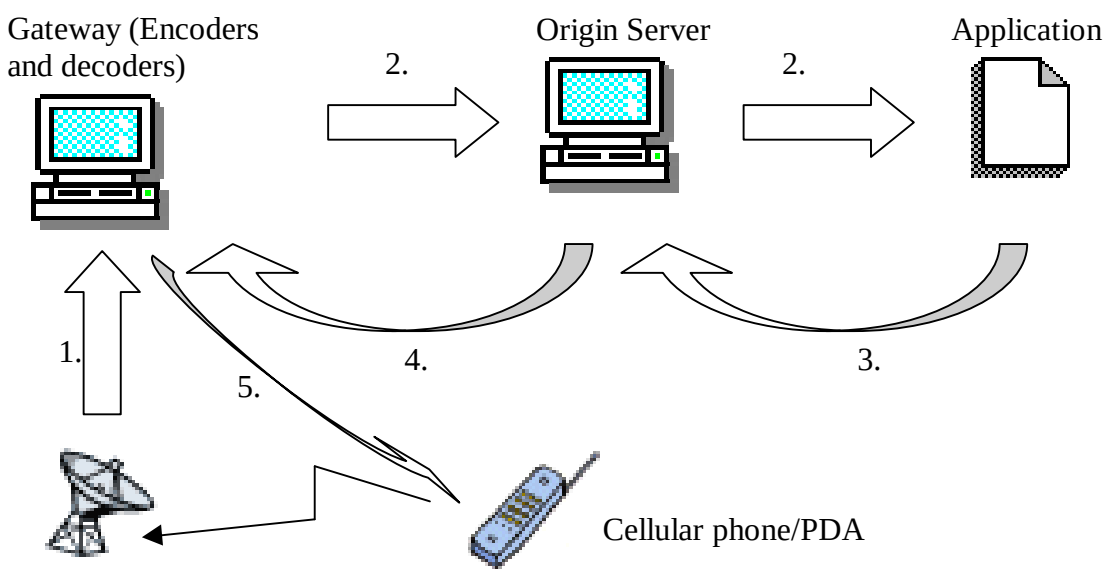
Technically, WAP uses XML (extensible markup language), which is a stripped down, more flexible version of HTML (hypertext markup language), as a browser standard for showing Internet content on digital mobile phones or PDAs in thin-client microbrowsers. The rationale behind developing this kind of standard lied

in the desire of creating a very bandwidth optimised standard which can work as rapidly as possible in slow wireless networks.

Also, the motivation was to make the standard platform independent (Heikkinen, 1999). A model of WAP is presented in figure 6.9.

Associated with the WAP technology are so called PDAs (personal digital assistants), which according to the PDA Industry Association can be defined as "primarily a productivity and communications tool that is lightweight, compact, durable, reliable, easy to use, and integrates into existing operations" (www.pdaia.org).

Other characteristics according to the association are that these small computers typically can be held in only one hand leaving the other to input data with using



1. Encoded request via the Wireless Application Environment (WAE). WAE offers the software platform environment for the application software on the phone/PDA.

2. Request to server and call of CGI scripts, etc.

3., 4., 5 Program´s response

Figure 6.9 A simple model of how WAP works (Heikkinen, 1999)

either a pen or a reduced size computer keyboard. Since these small computers have smaller memory and are to be used wireless, the WAP technology which serves these purposes has been developed for use in these machines as well as in advanced digital mobile phones. As a matter of fact, as digital mobile phones are getting more and more advanced technically and many PDAs offer better and better interfaces for telecommunication, the two technologies seem to converge more and more.

6.2.3 Web communication techniques

E-mail

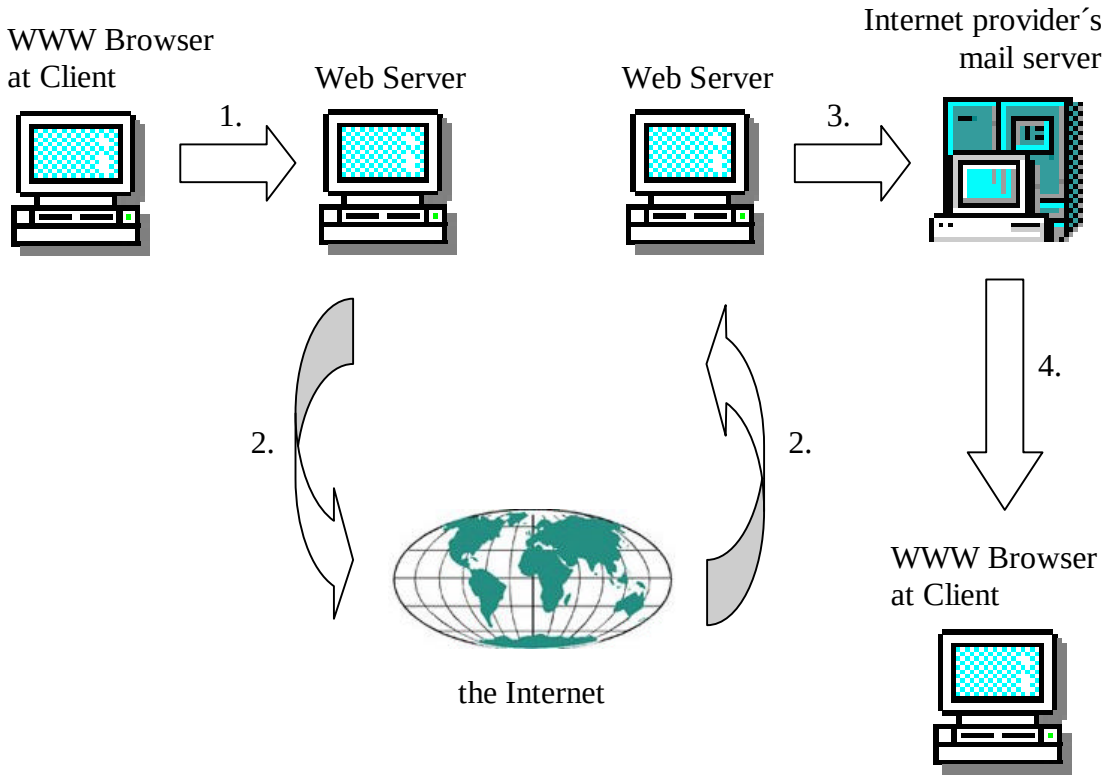
E-mail is short for Electronic Mail and stands for ”a computer-based system for exchange of messages and other information” (Bradshaw, 1996). E-mail is a quick, easy to use and a relatively inexpensive communication form which can be used over the Internet.

There is no need for the sender and recipient to be online at the same time since the e-mail is sent to the ”host” computer, often in the form of the server at the recipient´s site, and is available to the client as soon as he or she logs on to the system and start up his or her e-mail client software. A simple model of how e-mail works is given in figure 6.10.

In this way, e-mail is time and place independent and it is possible to receive and answer mail at a time and place which is convenient for the client. This is an important advantage with the use of e-mail for communication over the Internet.

Another advantage with this form of communication is that it is possible to include other documents, applications, pictures etc. in the form of attachments in the e-mail. This extends the communication possibilities as other means of communication can be used in addition to short messages included in the actual text.

Drawbacks with this communication form includes the risk of ”spam” mail, i.e. the receiving of unwanted mail in the form of advertisement from organizations and annoying, unwanted letters from private persons. Also, the attachment feature of e-mail client software makes e-mail a very common way of spreading viruses on the Internet.



1. Mail is sent.
2. Message arrives at client´s service provider's server and is sent over the Internet to the recipient's service provider.
3. Message is sent to the recipient´s service provider's mail server.
4. Message is delivered to the recipient.

Figure 6.10 A simple model of how e-mail works

Mailing lists

Electronic mail discussion groups or mailing lists are usually lists or services where many people contribute and receive information via electronic mail. This is in other words use of e-mail with more than one receiver. In these mailing lists it is a common practice that everyone that subscribes to the mailing list can read and reply to all the messages. However, there are of course also "limited" versions in the form of news letters where the information only goes from the sender to the many receivers without any discussion taking place.

According to Bradshaw (1996), there are two main types of mailing lists. So called e-mail lists and network news or Usenet news. By using e-mail lists, the client subscribe individually to a discussion list. Messages are sent directly to the list and are forwarded directly to the subscribers´ e-mail addresses. With Usenet News the local Internet service provider must subscribe to a ”news feed” which sends messages back regularly. The client only receive the messages from Usenet when he or she activates his or her "news reader" (ibid.).

An advantage of e-mail lists over Usenet news is that no "institutional support" in the form of "feeds" is needed.

An advantage with mailing lists in both forms is that they can collect related information and structure that information. It is possible to standardise the format of subjects and sender in the mail so that the user immediately when the mail is received can see that the mail regards a certain mailing list and therefore a certain interest of his or hers. However, the structure of the mails regard only the subject for the whole mailing list. It is not possible to structure sub-issues in the form of ”threads” which is often the case in web-based discussion forums.

ICQ

ICQ (sometimes pronounced as "I seek you") was originally developed by Mirabilis and is a program which is a "lightweight" e-mail/chat client where it is possible to chat in real-time and also let the user know when his or her friends and contacts also are online on the Internet. Apart from sending messages and see who´s on the Internet, files, in the form of single, multiple or whole directories can also be transferred between the clients using ICQ.

However, in order to use all these functions it is a requirement that both the parties taking part in the communication have the client software installed and have received a user identification number (UIN). ICQ is platform independent in so far that different versions of the client software for different platforms have been developed, not only by Mirabilis but also by other companies and programmers (for example, Micq for the UNIX/Linux platform).

The main advantages with ICQ over e-mail are the possibilities of "chatting" and sending short, instant messages between two clients. Although ICQ also can save messages on the receiving client´s host server, e-mail is better suited in this regard for more important messages which the user want the receiving party to be able to document and store. In short, ICQ is suited for same time, intense communication whereas e-mail is better suited for different time, important communication.

Guestbooks and forums

Apart from the mentioned communication techniques it is of course also possible to communicate using the Internet in itself. Two common approaches in this regard which often use the CGI or ASP technique, are what is in general termed "guestbooks" and "discussion forums". These are small systems available on the Internet where the visitors of certain web sites discuss or simply sign their mark and give short comments in the same way as ordinary guestbooks are used.

The two terms are used interchangably on the Internet meaning almost the same thing, although those systems which are labelled guestbooks often have fewer communication possibilities than those that are labeled discussion forums. The latter often use "threads", i.e. the possibility of discussing different subjects alongside in the forum where the replies to a certain post not is mixed with the replies of another.

An advantage of using the Internet in itself for this kind of communication is that the graphical user interface is flexible and easily adapted to the individual user. Also, the technical possibilities in the form of threads and connections to other technologies such as SMS and e-mail is also greater than for mailing lists which are used for the same group communication purpose as guestbooks and discussion forums.

An important disadvantage with guestbooks and forums compared to mailing lists is however the risk of having unwanted spam mailing and irrelevant posts. Since the Internet often is open to a wider range of users than for example mailing lists, the risk for spam is greater in the Internet environment. Also the risk of unwanted posts in a mailing list is more limited due to the fact that the subscribers of the mailing list themselves receive all the posts which are posted to the list. This makes their own e-mail inboxes flooding with mail if they spam the list at the same time as their e-mail adress in general is easier to detect on a mailing list than their IP-adress if they use the Internet for the same purposes.

7. The Organizational Decision Support System Prototype

In this chapter, the small, web-based organizational decision support system prototype we have created is presented. This chapter corresponds to purpose three, - To build a functional, small, web-based organizational decision support system prototype with capabilities in the areas of knowledge management and organizational decision support, providing different means of communication techniques in support of organizational decision making.

In the chapter, we present the different technology options we have chosen to use and motivate why we have done so.

The purpose of this chapter is to give a presentation and an overview of the system and give the reader an understanding of how the different subsystems which are involved in the whole ODSS interact with each other. Hopefully, this presentation also can give the reader a more thorough background to the description of the empirical study in the next chapter since the ODSS we have created has been used as a communication tool in our presentations and interviews with the respondents and they have given their points of view of the different functions that the system contain.

7.1 Categorization of our ODSS prototype

Against the theoretical background given in chapter 3 regarding categorizations of systems aimed at decision support into MSS, DSS, ODSS and GDSS, it might be of interest to give the reader a background to the categorization of our prototype into an ODSS prototype.

One reason for this categorization is the fact that the system prototype we have constructed have features which are intended for use in the whole organization and not just for isolated decision groups within the organization. An example of such a feature is the possibilities to generate separate password protected views of the system where different members of the organization can ba authorized for use of different parts of the system.

Also, the intelligent component in the form of the related search facility and the automatic file structuring of made decisions and preparations of those decision issues in the decision bank (see system manual, Appendix II) is a feature which is usually found in an ODSS kind of system.

Although we have chosen to categorize out system prototype into the ODSS category, the prototype have a large focus on decision support of groups in the form the chosen definition of GDSS describes. As mentioned in chapter three, however, we have chosen to view GDSS as a form of an ODSS and since our system have some capabilities which correspond better to the wider definition of ODSS, we have chosen to use this term in order to label and categorize the system prototype.

7.2 Technical Overview

On an early stage of our development of an ODSS prototype, we chose the Internet as the technical platform from which the applications should be developed. The reason for this choice was the rapid development of Internet use and the geographical independency the choice of the Internet as a technical platform means. For the decision makers the Internet in most cases can be reached at home as well as on the job which of course is an important advantage of using this technique along with the fact that most browser software is free or already installed in some operating systems (such as Microsoft Internet Explorer).

As for the decision of programming platform for the web-based organizational decision support system prototype we have created, the choice fell on a combination of thin- and fat client techniques. However, the technical focus of the system is more on thin- than on fat clients and the fat client technologies used (mostly Javascript) has a more complementary use in that we have chosen this technique only for specific routines where the CGI/Perl approach is definitely not appropriate.

An example of such a routine where this is the case is input masks since these should be triggered as fast as possible and detect errors occurring at the client before incorrect data is sent to the server. The motivation behind this reasoning is that erranous inputs to the system should be detected and corrected as soon as possible and not claim unnecessary server power.

Apart from practical reasons for chosing the technical platform, such as installed operating systems (OS) and servers at the Institution for Informatics at the Gothenburg School of Economics and Commercial Law, the choice of technical platform in the form of CGI/Perl combined with functionality at the client in the form of Javascript in favour of, for example ASP, is due to the fact that the CGI/Perl technique is more of less totally platform independent.

At the beginning of the writing of the thesis and the choice of respondents for the empirical investigation we did not know what kind of organization we would investigate and what installed technical base the respondent organizations would have.

Since we in that situation wanted to be as flexible as possible and possibly test the system at the chosen organization, we wanted to create a general-purpose system not specified beforehand for any particular type of organization and use a general-purpose technical solution which could be applied on any technical platform used on the Internet.

As for the technical structuring of the system, we wanted to create an ODSS prototype which would be modularized to a very high degree, i.e. we wanted the different parts of the system to be interrelated but on the same time not dependend on each other so that the different subsystems involved in the prototype technically would have to be used together. The reason for this, was that we wanted to create a system prototype where the user in the form of an organization could choose to use only those modules the prototype consists of which that organization would find useful.

7.3 The four subsystems

The organizational decision support system prototype consists of four interrelated subsystems or system modules. These are a discussion forum where the decision makers of the organization can communicate with each other and make decisions over the Internet, an agenda which the decision makers can use in order to keep track of important dates and events in the organization, a "decision bank" in which it would be possible to search for issues already decided upon and learn more about these in the form of an organizational memory, and finally an administrative subsystem which could be used by an administrator of the ODSS. An overview of the ODSS on a subsystem level is depicted in figure 7.1 below.

In the following (sections 7.3.1 – 7.3.4), the four subsystems of the created ODSS prototype and their different functions are presented in more detail. Finally, in section 7.3.5, a discussion regarding the four subsystems in the ODSS is presented.

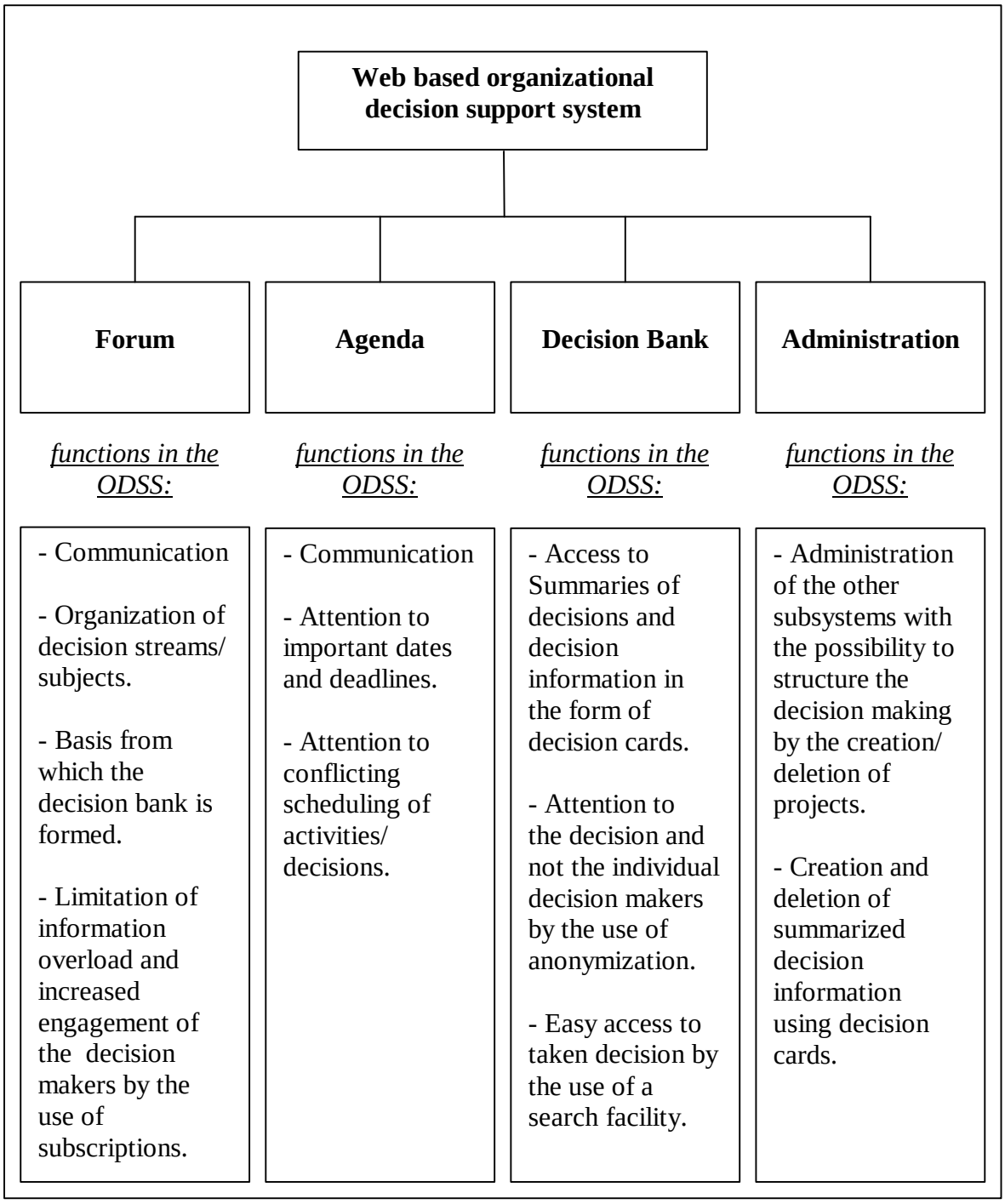


Figure 7.1 A basic scheme of the ODSS, the subsystems and their functions

7.3.1 The forum subsystem

Having considered the different possible communication methods on the Internet which are described in chapter 6, the use of an Internet forum programmed in CGI/Perl was chosen for the communication part of the ODSS.

The reason for this choice was on the one hand the possibilities of integrating this subsystem with the decision bank which can be used as an organizational memory. The reason for this choice, was that it would have been much more difficult to implement connections technically between these two systems if the communicative part had been solved using, for example, a mailing list.

Communication

The purpose of the forum subsystem is first and foremost pure communication between the decision makers in an environment which is intended to be structured, intuitive and safe. Basically, the discussion forum can be likened to the a form of electronic brainstorming discussed in section 4.5.4.

Structured and intuitive, due to the possibilities of dividing different decision subjects into threaded discussion subjects. Here our intention was to divide the different decision streams in the organization into well defined corresponding streams also in the forum subsystem, i.e. each decision problem in reality would be corresponded by a threaded decision subject in the forum making the structure of the discussion forum as intuitive for the user as possible.

As mentioned in section 5.3.2, according to Agahi (1999), structuring also can help the decision makers focusing more on the decision problems by structuring these and make previously gained knowledge more easily available. In this way, the decision makers can become less confirmation biased, better participants and collaborators.

Safe, since the discussion forum should be accessible only for registered users having proper login access, thereby excluding unauthorized use and securing an open debate. We found the safety issue important since the issues discussed in the forum would be issues of high importance for the organization which should not be accessible for unauthorized use. Also, we were under the impression that only a secure discussion environment would foster a truly open debate since the users of the forum otherwise would be unwilling to express personal opinions and discuss matters of great importance to the organization due to the strategical use of that information.

Regarding the issue of internal openness in the debate and possibilities of anonymity in the debate, we chose a solution where the authorized decision makers using the forum can choose whether to be anonymous or not.

Our motivation for this choice was that it is possible that some opinions, even for a well-known audience, might be considered taboo (cf. section 4.2.2 and 5.2.3) and there might be times when individual decision makers favour being anonymous when presenting radical ideas not widely accepted by the other decision makers in the group. This choice also supported the purpose of focusing more on the decision problems discussed than on the individual decision makers in the group who presents opinions and ideas about the decision making.

Development of a feature for discussions with Delphi characteristics was at an early stage discussed for the forum. The intention was to use sending of SMS messages to and from mobile phones and the system and in this way make it possible to give opinions regarding decision issues in a flexible way in cases some decision makers did not have access to the Internet and/or the group of decision makers wanted to arrange an anonymous votation about a decision issue by using the discussion forum.

However, after some initial development, this feature was dropped due to restrictions in the sending of free SMS messages via the free SMS service provider Mtnsms (www.mtnsms.com) which we had used in order to test the feature.

Structure

The structure of the decision subjects in the forum can be influenced by the administrator of the debate as well as by the decision makers themselves. The administrator can influence the structure by the creation and deletion of projects. The decision makers taking part in the discussions on the forum themselves can also influence the structure by creating subjects within each of the administrator´s predefined projects.

Our motivation for chosing this solution, is the possibility that the organization might have several predefined project teams working simultaneously, thereby motivating the provision of projects by the administrator which are thought to have an overview of the operations in the organization or receive directives about the structuring of project teams from general management in the organization.

The discussions in the form of threaded subjects between the members of the different projects might however sometimes be better structured by the project members themselves, since the members of a project probably are the ones in

the organization who know the actual project best since they are included in the work associated with the project. Therefore, a structuring of the decision making is also facilitated by the use of threaded decision issue streams initiated by the users of the system.

Our choice regarding the division of the discussion into projects and threaded subjects is also based on an intention of facilitating a creation of "fields" and "self-organizated teams" as proposed by Nonaka, 1994 (see section 5.2.1). It is our hope that such fields can be created by structuring the system both volunteerily by the users of the system in the form of threaded decision streams, but also to some degree managed by the use of projects initiated by top management.

From this discussion it follows that our general view of an organisation using the ODSS has some sort of top management managing the work in the company or organisation in the form or ”projects” or ”departments”. Of course this is not necessarily true in all organisations and some small organisations might just have one or a few simultanous projects with little need of administration of this feature in the system.

It is of course therefore possible not to use an administrator of the discussion forum, and the decision of dividing the discussion into different predefined projects or not is a choice of the particular organisation using the system.

Another choice of the organization which regards the use of an administrator concerns if this administrator should have an administrator in the form of a facilitator or a chaffeur (cf. section 4.5.2). Of course this choice is also a choice of the using organization although administration in the form of a facilitor might result in a more flexible system of administration than the use of a chaffeur since the facilitator him/herself take part in the discussions and therefore achieve a better understanding for how the work should be structured in the form of projects.

Subscriptions

Subscriptions is a feature available in the decision forum with which the decision makers can choose which decision subjects they want to keep an extra eye on in the ongoing debate. By chosing to subscribe to a subject, the decision maker will be reminded by e-mail every time the decision subject he or she has a subscription to has got a new reply.

In this way, it is possible to decrease information overload since the decision makers can focus on those issues they have most interest in. They do not have

to check the forum every now and then only to see if the decision subject they have an interest in has got a new reply since they last logged in. However, as we see it, the risk associated with this kind of subscriptions is that the decision makers might focus too much on a few issues instead of engaging in the debate concerning other issues.

In order to minimize the risk of this behaviour and increase the engagement for other decision issues, we chose to use e-mail in the form of subscriptions only as a way of informing the decision maker that the subject he or she has subscribed to has got a new reply, - not to include the reply in the e-mail message which had been a possible option. In this way, the decision maker who subscribes must visit the decision forum in order to read new replies and hopefully this will also make him or her checking other decision subjects as well, decision subjects he or she is not a subscriber of, and/or initiate new decision subjects in the forum.

In sum, our intentions with the subscriptions therefore are to decrease information overload but not at the expense of a decreased engagement as well. On the other hand, our intentions with the subscriptions are to increase the visiting rate of the forum and thereby increase the engagement for discussion among the decision makers taking part in the decision making of the organization.

7.3.2 The agenda subsystem

The agenda subsystem can best be described as a filofax for the whole organisation. The purpose of this subsystem is to keep track of important dates and events in the organization as well as coordinate these events in order to minimize deadlocks in the organisation regarding ongoing projects and coordinate the decision making in the organisation.

By using the agenda, the time schedules for the different decisions made in the organization becomes visible and the use of a collective filofax can be used as a basis from which the individual decision makers plan their own time schedules. In this way, the operations of the organization can be better coordinated and the decision making and the preparations of decisions can be better syncronized and done at the right time before the final decision making and the implementation of the decisions.

Communication

As with the forum, the agenda focuses on communication. We found the development of this subsystem important due to the fact that, in our view, the forum does not give the users enough ”process support” in the form of visualized time schedules for the projects.

The users of the forum discuss several issues regarding a project simultaneously and without interaction between the different decision subjects due to the thread structure of the discussions where the decision making regarding a specific project is divided into several independent subjects. By using the agenda which defines activities and deadlines for the projects as a whole, the decision makers can get a more general perspective of the work in the project and hopefully better understand the interaction between the different decision subjects in the project.

Structure

The agenda is divided into two time schedule views, - one showing the current month for one information category for all (default) or for a specific project, the other showing the same information in the form of an open filofax showing two pages with one week of information each (see figure 7.2 on the next page). It is possible to go back and forward in time using buttons for this purpose in both views.

In the view over the whole month, the information is showed using three information categories, - meeting, deadline and other information.

Our intention with the meeting category ("möte" in figure 7.2) is that this category can be used by the concerned decision makers of a project in order to reserve time for face-to-face discussions in the form of meetings which complement the virtual discussions on the discussion forum. Since such meetings are dependent of the time planning of the decision makers who might have many other responsibilities apart from the actual project, this necessary time planning and scheduling of activities can be arranged by using the common agenda.

The deadline category is intented for increased attention to implementation of made decisions. By deciding on a deadline date for the implementation of a decision which is visualized in the agenda subsystem for the whole project- and/or organizational group, we think that the goal of implementing the decision becomes more obvious and apparent for the decision makers as an ”official” deadline in this way is set and followed up.

Finally, the category for ”other information” ("övrig information" in the figure 7.2) can be used for information related to the agenda but which do not fit in the previous categories.

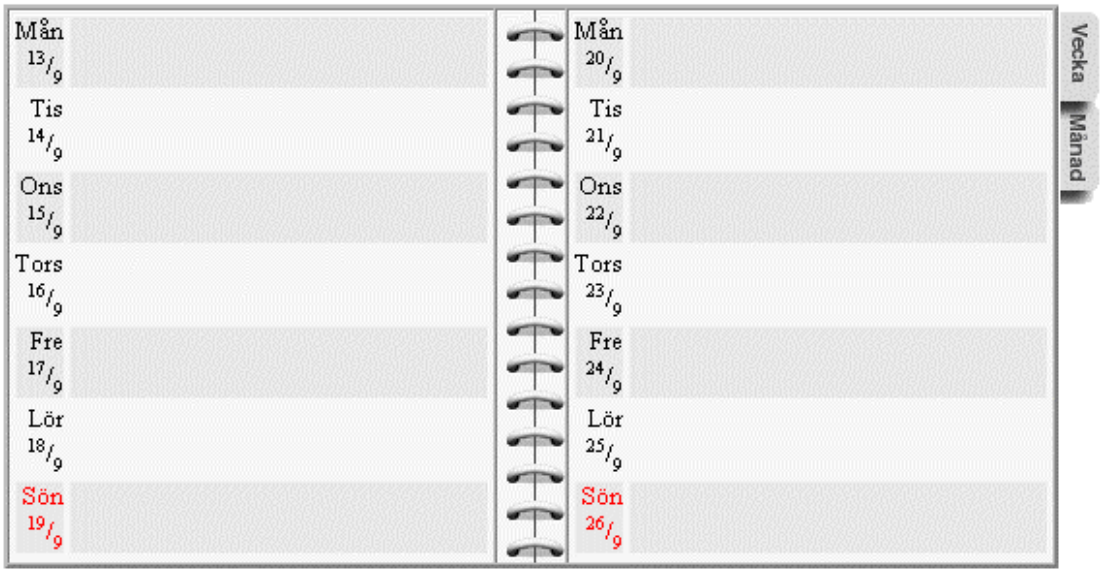
September 1999

Vecka	Mondag	Tisdag	Onsdag	Torsdag	Fredag	Lördag	Söndag
I			1	2	3	4	5
II	6	7	8	9	10	11	12
III	13	14	15	16	17	18	19
IV	20	21	22	23	24	25	26
V	27	28	29	30	1	2	3
VI	4	5					

Vecka Månad

M Möte D Deadline I Övrig information

The monthly view of the agenda (default).



The weekly view of the agenda.

Figure 7.2 The two views in the agenda subsystem

The weekly view of the agenda in the form of an open filofax showing two pages, each with one week of information, has no categories in the same way as the montly version. Here, however, the information is written directly in the agenda, - exactly like an ordinary filofax. In the monthly view on the other hand, the information is made visible only in case the user moves his/her mouse pointer over the icons for the different categories.

We chose this way of showing the information on the monthly version due to space constraints in the agenda, - if all information had been written directly in the monthly agenda, it would become impossible to get an overview of all the month´s activities in one single view without having to scroll the browser window. The main use of the agenda in the monthly view is therefore to increase the overview of all the decisions and activities of a project/organisation and to decrease information overload.

7.3.3 The decision bank subsystem

The subsystem for the organizational memory part in the ODSS, - the decision bank, is constructed on basis of the theories of Agahi, 1999 (see section 5.3.2). We chose this theoretical basis due to the fact that the theoretic framework for an organizational memory that Agahi (1999) promotes, is detailed and more easily can be implemented practically than, for example, the theories represented by Linger & Burstein (1998).

If the discussion forum can be said to correspond to communication support and information processing support in Zigurs & Buckland (1998) categorization of decision support, the decision bank subsystem corresponds to what these authors categorize as information processing support. By using the decision bank subsystem, the organization that uses the ODSS prototype hopefully can inprove their capability to gather, aggregate and structure the decision information.

Anonymity

The strong connection of the practical implementation of the decision bank to the theories of Agahi (1999), can be examplified by our use of ”decision cards” in the system prototype in the way they are presented by Agahi (see figure 7.3 on the next page and compare with Agahi´s model of organizational memory system data structure in figure 5.6). In the decision cards, it is possible to anonymize the decision makers who have made the decision. In this way, the decisions can be regarded as ”the group´s own decisions” and be something all the decision makers are responsible for.

Since no particular decision maker in this way can get the blame for decisions which afterwards turn out to be wrong, it is possible that this leads to more engagement for the decision making and a lower risk that some decision makers avoid coming up with creative suggestions regarding decision issues due to the fact that they are scared of being nominated as scapegoats afterwards.

Another use of the decision card is that it provides a form of "catalog knowledge" (cf. section 5.1.1) in Ruggles (1997) terminology in that it provides the decision makers with knowledge about "where" the decision and the preparations for that decision is due to the search facilities provided by the decision bank and the possibilities to relate to other decisions by using key words.

By using the decision bank and the forum in combination for the preparations of issues instead of, for example, using e-mail and internal mail, all decision information is structured at once and collected to the same place due to the automatic structuring of the decision threads of the forum in the decision bank.

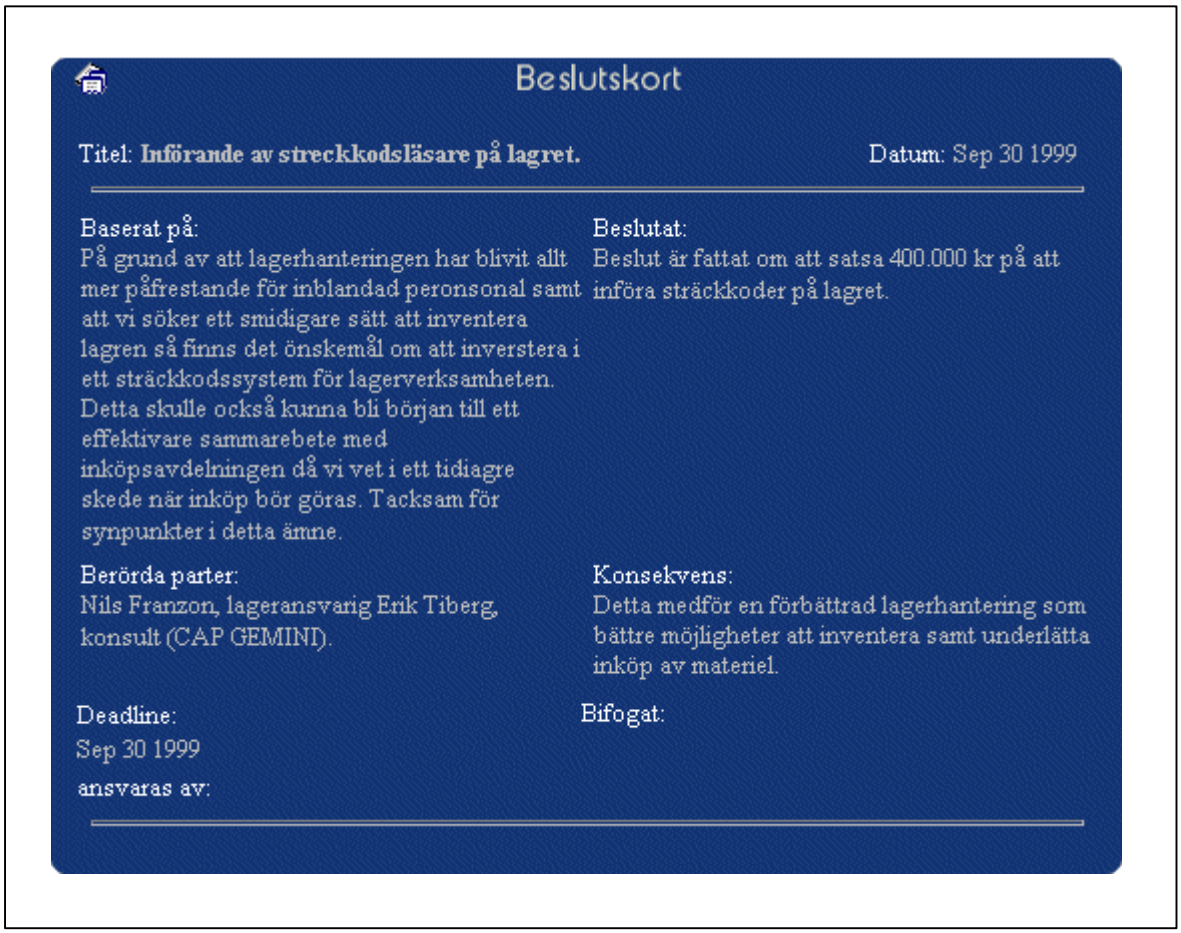


Figure 7.3 The decision card as implemented in the ODSS prototype

Structure

As mentioned above, the structuring of the decision subjects in the forum is related to the structure of the concluded decisions available in the decision bank. In this regard, the structure of the decision subjects in the forum becomes a blueprint for the final decisions which are forming the organizational memory in the decision bank subsystem.

This structuring occurs automatically, and the decisions in the decision bank are structured in a two-tiered tree-structure (similar to the structure in, for example, Microsoft´s explorer and other exploring client software, see figure 7.4) on basis of, on the one hand, the available projects in the forum and on the other hand, all available decisions in the decision bank.

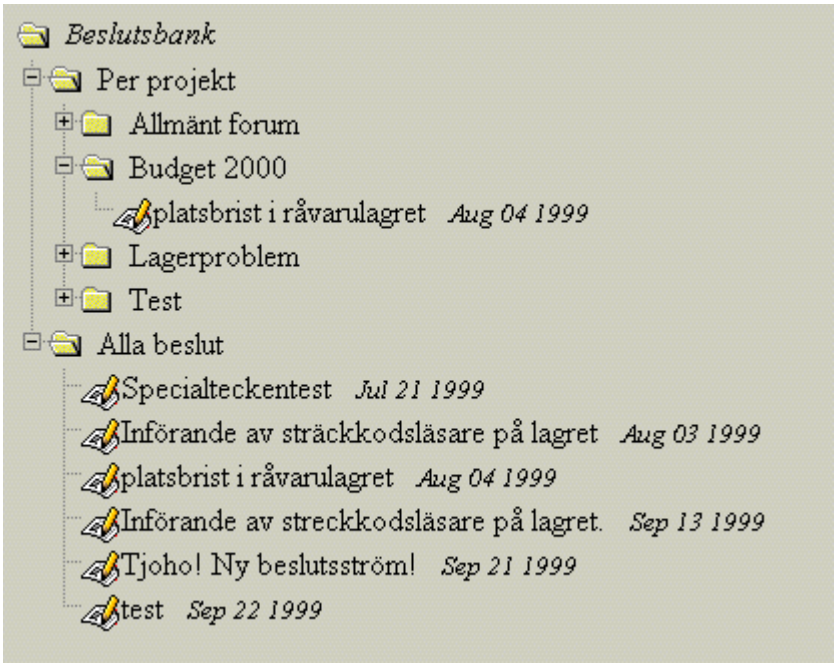


Figure 7.4 The two-tiered tree-structure of the decision bank

The motivation behind the choice of structure in the forum and the decision bank is that we view each decision subject in the forum as an evolving decision. When the decision is agreed upon after the issue has been discussed in the discussion forum, a decision card is written and the decision and the preparations for that

decision in the form of discussions in that thread in the forum is stored in the decision bank. When a decision thread and the final decision is written and stored in the decision bank in the form of a decision card, the decision thread in the forum is considered as finished and the thread is taken away from the forum.

Access

An important focus of the decision bank is on access to knowledge available in the organizational memory. When developing the ODSS, we have tried to achieve this in several ways in the decision bank subsystem.

First, as mentioned above, the structure of the final decisions in the decision bank corresponds to the discussion forum where the discussion subjects have originated. Second, a search facility has been added to the decision bank so that it is possible to search for decisions based on key words and date. Finally, the possibility to create own search criteria in the form of key words at the creation of the decision cards, makes it possible to search for related decisions in the decision bank from the decision forum.

The reason why we have emphasized access in this subsystem is obvious, - the organizational memory subsystem should be used as a support for future decision making and organizational knowledge should be easily accessible so that the decision makers in the organization rapidly can build on previously made discovories and experiences withouth having to ”invent the wheel” once again every time they are going to make a decision which, to some extent, have characteristics in common with previously made decisions.

7.3.4 The administration subsystem

The final subsystem in the ODSS, - the administration subsystem is used in order to facilitate the ongoing use of the other subsystems and, to some degree, manage and direct the use of the system, for example, by the use of creation and deletion of projects as mentioned in section 7.3.1. The decision cards, which store decision information in the decision bank can be created in the administration subsystem if the user of the administration system has access to that area. Finally, it is possible to add/edit and delete users of the other subsystems in the administration subsystem.

7.3.5 Discussion

On basis of the above presentation of the different subsystems of the organizational decision support system, a model over how the system is intended to work can be depicted as in figure 7.5.

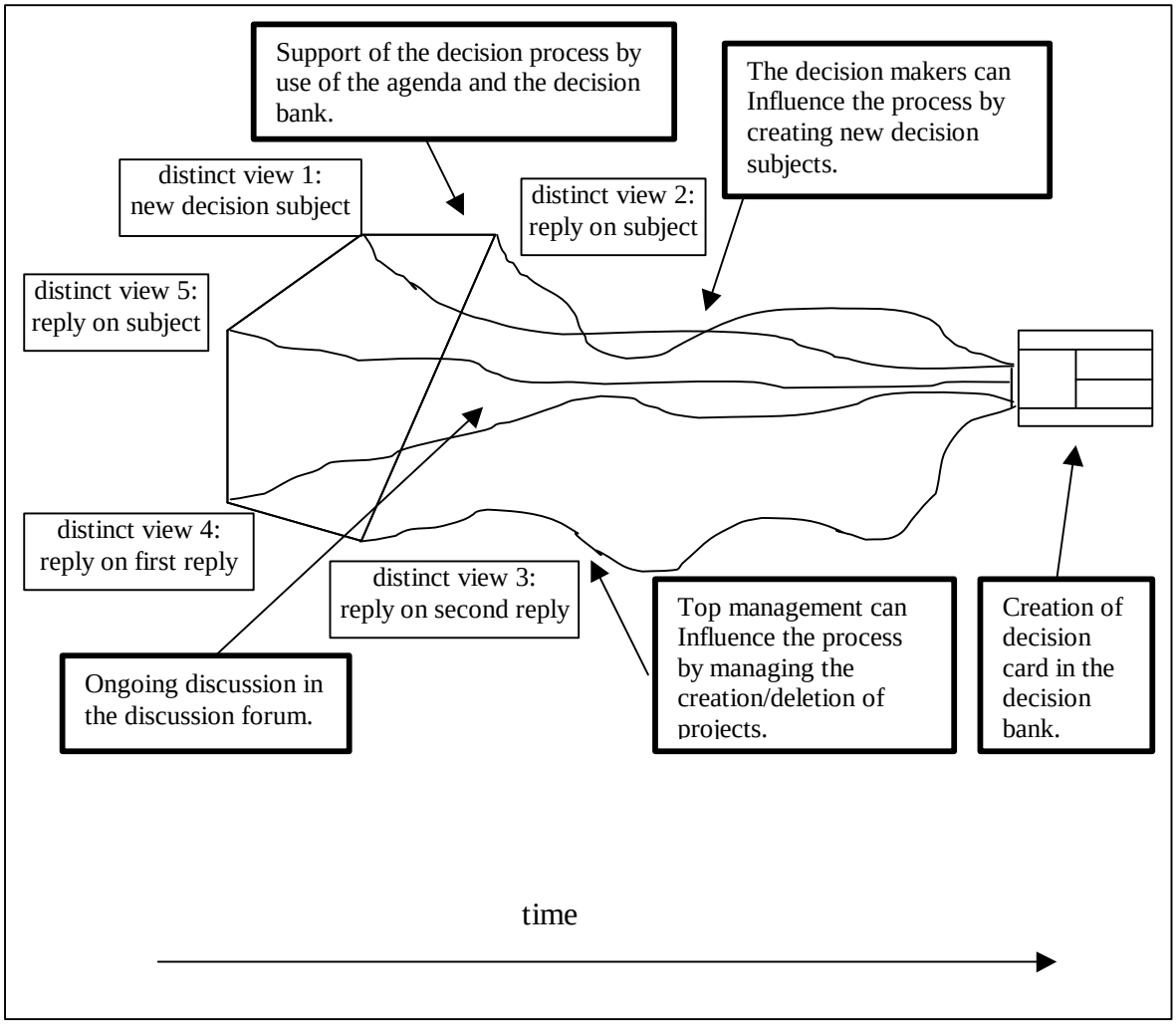


Figure 7.5 The intended influence of the ODSS prototype on the decision making process.

As can be seen in the model, the decision making process is intended to start by a discussion in the discussion forum in the form of a discussion subject and replies to that subject and other replies. This process is then supported by the use of the agenda in order to coordinate decision activities and schedule activities necessary to carry out the decision as well as the decision bank in order to collect information and knowledge about previously made decisions.

As mentioned in section 7.3.1, the whole decision process can be directed by the management of projects by top management (through the administration subsystem) and by the creation of discussion subjects by the involved decision makers.

When the decision makers have agreed on a decision, the decision information is summarized, anonymized and memorized into a decision card which is stored in the decision bank where it can be accessed when needed in future similar decision making situations, during the implementation of the decision and after implementation in order to check if the experienced consequences of the made decision corresponds to the taken decision (the decision card) and the intentions before the decision (the preparations).

8. The Empirical Study

In this final chapter of the thesis, the empirical study regarding group decision making and knowledge managemant in the two organizations investigated, - the Faculty for Gothenburg School of Economics and the Administrative Faculty for Social Sciences, both parts of Gothenburg University, and SKF Technical Service and Maintainance is presented.

This chapter corresponds to purpose two, i.e. to empirically study group decision making and knowledge managemant in two chosen organizations with regard to how decisions are made today in the organization as well as current use and practices of support systems for group decisions and knowledge management, and preferred use and practices of support systems for group decisions and knowledge knowledge management.

The purpose of this chapter is to present the empirical findings from our investigaions of the two organizations and present our conclusions and analyses regarding these on basis of the presented theories in earlier chapters.

In the following, the empirical research is presented in a chronological order of its implementation.

8.1 Initial presentation

At an initial stage of the systems development phase, using mostly static prototypes of the four subsystems of the ODSS, we had the opportunity to present our ideas and achievements so far made for two researchers at the Institution for Informatics at Gothenburg University who had a lot of experiences regarding this research field.

In section 8.1.1, we give a short background to the choice of arranging an initial presentation of the ODSS and our ideas for the system which we later would use in the empirical study. In section 8.1.2, we describe the presentation of the system we had for the two respondents. Finally, in section 8.1.3, we analyze the experiences we achieved from this initial presentation.

8.1.1 Background

The purpose of this initial presentation was to get feedback about the system so far and prepare for the later empirical study. It was at this stage possible to

communicate and discuss about the system prototype since we had prepared static, unprogrammed GUIs of the ODSS showing how the system would look like when it was finished.

However, since at this time, it was not possible to show the features of the system practically, it was more difficult and took longer time to describe the features the system would have and our ideas behind them. On the other hand, the respondents were experienced regarding decision support systems and systems development in general which of course made it easier to refer to research theories and other issues regarding the system development process than it would have been if we at that stage had presented the ODSS for respondents for whom everything was new.

8.1.2 The presentation

The presentation of the ODSS took place at the Institution for Informatics in one of the conference rooms at the institution. First, Faramarz gave a theoretical background about group decision support and knowledge management and thereafter we presented a system, with ODSS features, which we already had constructed as a part of an earlier course about decision support systems at the Institution.

The purpose of this first presentation was to give the respondents a thorough background to the development of the new ODSS prototype and what we based our ideas on regarding the system development of this new system.
Finally, we presented the new ODSS prototype we were going to develop in the form of GUIs using static HTML and very limited functionality.

During the presentation a couple of questions were raised and the two researchers gave comments about the system prototype. One of them liked the ideas we based the ODSS prototype on, but he also had critical comments mainly regarding the access to the system which in his opinion was too tricky.

According to that researcher, decision makers of today often are short of time and therefore the ease of access to an ODSS system is crucial for its success. Also, he thought that decision makers would favour using the system if it was accessible from a mobile phone and not only could be accessed via the Internet. However, the researcher stressed that his opinions in this regard was his own and that it was possible that other decision makers would have more use of the system in its Internet based form than he would.

Like the first researcher, the other respondent liked the ideas we had with the system but he pointed out the importance of making the system secure for the

users. According to him, it is not only important that the system is safe for unauthorized use, the decision makers themselves also must feel that it is safe, otherwise they would not feel like expressing opinions and organizational secrets on the discussion forum.

8.1.3 Analysis

The initial presentatation gave fruitful inputs first and foremost regarding the system development, for example in the form of the idea of using the system over mobile phones as a complement to a pure Internet system implementation. The presentation also gave some inputs regarding decision making in general, for example, issues such as ease of access to the support given to the decision makers and the decision makers´ sense of security were important issues which the respondents made us pay more attention to.

Table 8.1 The initial presentation

Locaction:	Conference room at the Institution for Informatics.
Respondents:	Two researchers in the field of organizational decision support, Institution for Informatics
Time for presentation:	appr. 40 minutes
Time for discussions:	appr. 25 minutes
Presentation form:	Portable, Internet connected computer and a portable projector
Documentation:	Yes, to all respondents (systems manual)
Participants from the master thesis group:	Supervisor Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong Strömberg

Regarding the presentation as such, we decided to drop the presentation of the first system, with ODSS features, which we already had constructed as a part of the course decision support systems. We found at the presentation and the discussion that followed that this only confused the respondents and that the presentation as a whole took too much time if a presentation of this first system also was included. Some general facts about this initial presentation are given in table 8.1 on the previous page.

8.2 The Faculty for the Gothenburg School of Economics/the Administrative Faculty for Social Sciences

In the following we will present the empirical study we have conducted with the Faculty for Gothenburg School of Economics and the Administrative Faculty for Social Sciences, both of which are subordinate Gothenburg University.

Since both these decisive bodies of decision makers are part of the larger organization Gothenburg University, we have chosen to group them and to some extent analyze them together. We have chosen to do this since both groups of decision makers work with the same kind of issues (regarding education) and are subordinate to the same top management, i.e. the Principal of Gothenburg University and the board of Gothenburg University.

Also, the two decisive bodies exchange some information between them and have other connections as well. An example of such a connection is that the secretary of the Faculty for Gothenburg School of Economics is also a member of the Administrative Faculty for Social Sciences. The organizational structure of Gothenburg University is complex. However, a very simplified figure of the connections between the University and the two decisive bodies investigated in the study is given in figure 8.1 below.

In section 8.2.1, we give a short background to the choice of the Faculty for Gothenburg School of Economics and the Administrative Faculty for Social Sciences as respondents for the empirical study. In section 8.2.2 - 8.2.5, we describe the data collections from the respondents. Finally, in section 8.2.6, we analyze the responses of the empirical study.

8.2.1 Background

The Gothenburg School of Economics, which is a relatively independent unit within Gothenburg University, was contacted early during the writing of the thesis as a potential respondent regarding group decision making and knowledge management.

In our first discussions with the school, we agreed upon doing our empirical research on the Faculty for Gothenburg School of Economics which is the board of directories of the school. The members of this board are representatives for the seven institutions that the School of Economics consists of and apart from the representatives from the institutions, students are represented in the board.

In general about 8 – 14 members of the board are present at each meeting the board has. The board has formal meetings approximately once a month where they decide on issues on behalf of the whole School of Economics. Examples of decision subjects are employment of new staff and allocation of resources.

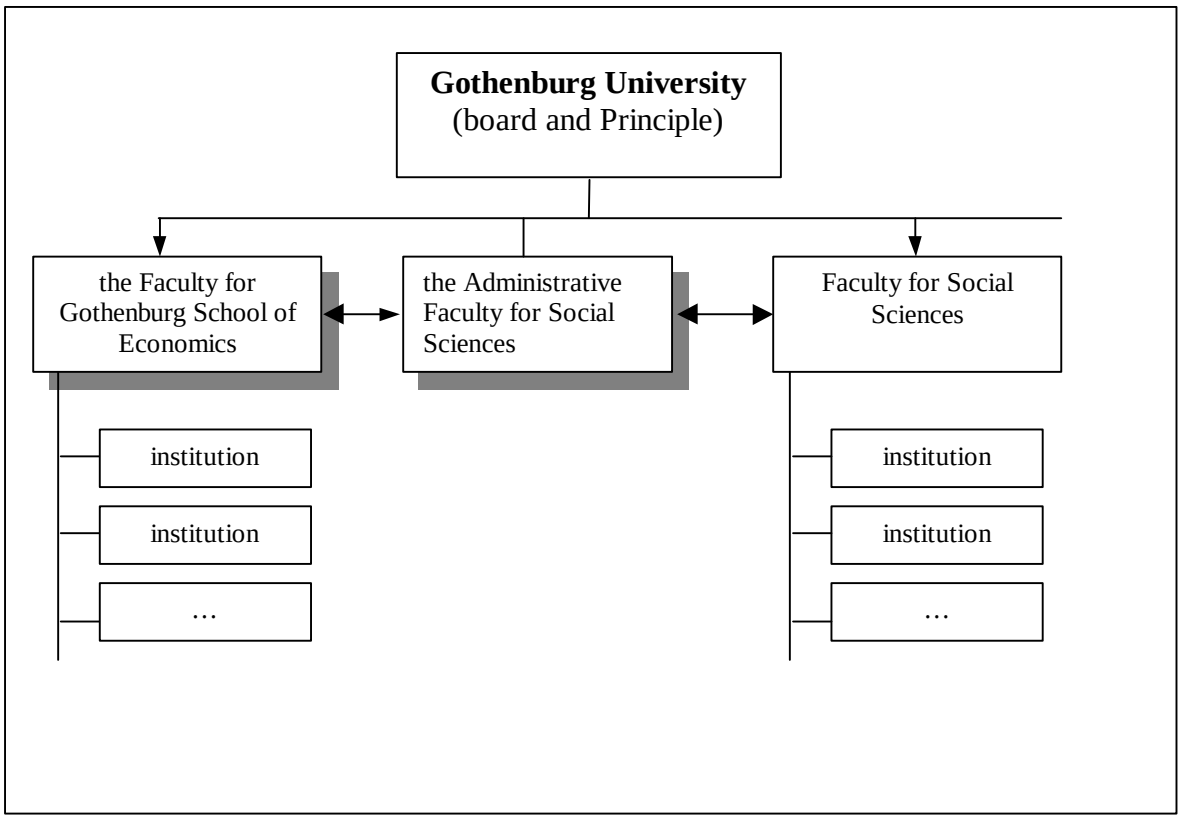


Figure 8.1 Simplified organizational structure of Gothenburg University

Apart from the Faculty for Gothenburg School of Economics (hereafter also referred to as FGSE), we also got in contact with the Administrative Faculty for Social Sciences (hereafter also referred to as AFSS) within Gothenburg University.

This contact was initiated after talks with FGSE where we were recommended to contact AFSS since they, by one of the members of FGSE, were perceived as more suitable for the kind of system we were going to develop. The AFSS has 12 members and the decisions that they make regards administrative issues, such as salaries and budgets for institutions within the social sciences within Gothenburg University.

The reason we chose the Faculty for Gothenburg School of Economics and the Administrative Faculty for Social Sciences as respondents for the empirical study is twofold. First, our supervisor Faramarz Agahi has participated as a director of studies at the FGSE and recommended us to use this decisive body for empirical studies of group decision making and knowledge management. Second, we are students at the Institution of Informatics, one of the Institutions which are a part of Gothenburg School of Economics and Gothenburg University. Therefore, it was a choice close at hand for us since we already knew some about the organization.

8.2.2 The presentation for the FGSE

The first "real" presentation of the ODSS prototype was with the FGSE after we had added functionality for the forum subsystem and the decision bank. Due to time restraints, this presentation was shorter than the initial presentation and before the meeting with the respondents for the presentation we had planned for more discussions during this presentation than we had had during the initial presentation in order to find some answers to the questions we wanted answered in the empirical investigation.

The presentation of the system took place at Malmstensvåningen at Gothenburg School of Economics, one of the conference rooms which the FGSE regularly uses. Since the members of the FGSE all are busy decision makers and it was difficult to arrange a special time for presenting the system, we had agreed on presenting the system during a break of one of the regular meetings that the FGSE had.

After the presentation we had a short but intensive discussion with the respondents (unfortunately shorter than we had planned for) where we asked them questions about their way of making decisions today, what they thought about the system and if they thought any particular functions could be useful for them in their decision making. Regarding the decision making today, one of the

respondents gave a summary of how the FGSE functions and the normal procedure of their decision making:

According to the respondent, issues about which decisions are to be taken can be raised in many ways. Often, internal issues at the School of Economics are raised at any of the institutions which are represented by the FGSE.

Normally, the person who represents that institution then raises the issue at the next meeting of the FGSE, but if the issue is important, discussions take place over the phone and/or via e-mail with those persons in the organization who have responsibilities or knowledge about the particular issue. This preparation of issues most often take place at the institutional level if the effect of the issue is local at the institution in question.

Sometimes, however, issues affect many institutions and these take longer time to prepare, since more discussions about the issue must take place before it is suitable to raise the issue at one of the formal meetings of FGSE.

Apart from the decision issues which come "from below" in the hierarchy, i.e. from the institutions, some decision issues also come "from above", i.e. from the board of the University or from the University principal. These issues are often of the kind where the FGSE are inquired to give their opinion about the issue or simply see to it that the issue is implemented at the institutional level. In general, the more complex an issue is and the more institutions that are affected of it, the more the issue is prepared before the FGSE makes a formal decision about the issue.

Regarding the system as such, many of the respondents gave positive comments about it although we had a feeling that the comments were more of the politeness kind than truly critical.

On the question of whether the system could be of use for them, the opinions were divided. Some respondents reckoned the posibilities of engaging in the decision issues working from distance, for example when they were travelling, as advantageous. They argued that it would make it possible for members of the FGSE who did not have the possibility to be present at a meeting, to come with suggestions regarding the decision subjects from where they were, simply by connecting to the Internet.

A couple of the respondents found no need for the system due to the fact that they already used e-mail as a means of communication in the preparations of issues before the formal meetings. However, they agreed that this was a habit with mixed blessings, - for example, (as some other respondents noted), this made a conversation almost impossible due to the large number of e-mails

involved. Also, the risk was that important e-mail about decision issues were mixed with other mail regarding totally different issues and therefore these e-mails regarding decision issues were neglected.

Another view, which was represented by some of the respondents, was that it would not be possible to implement this kind of ODSS for the FGSE without using some sort of facilitator. They meant that the discussions should be more directed and that the facilitator would be responsible for the use of the agenda and the writing of the decision cards. The decision cards would in their view contain the same information as is agreed upon during the monthly formal meeting the FGSE has and it would not be possible to make a decision solely "virtual" using the ODSS. The decisions have to be discussed face-to-face also.

When asked about which advantages and disadvantages the respondents saw with the decision making today in the organization and the initiation of issues to be decided on, many of the respondents stressed the flexibility of having a secretary who could coordinate the decision making as an important advantage. According to them, this "collecting" of decision issues before the meeting was crucial for the decision making of the FGSE and without the secretary, the decision making would not function properly.

A disadvantage with the way the FGSE worked which was mentioned by one of the respondents concerned the unstructuredness of the preparation of issues. According to this respondent, it would be better if more formal rules were applied for the preparations as well, not only for the final decisions which were documented according to a set standard in protocols. However, this view was opposed by some other respondents who meant that the flexibility in the preparations of issues on the other hand was an advantage in that this did not "steer" issues in a formal pattern which did not fit individual decision issues.

On the whole, the respondents viewed a high level of structuredness as advantageous for the possibilities of getting an overview of the decision making process and for the documentation of made decisions. Flexibility, on the other hand, was good in that it enabled the decision makers to adapt the decision making process according to the characteristics of the issue.

In general, a structured approach of decision making was regarded as favourable when deciding on simple, routine issues. Flexibilty in the decision making was more favourable when dealing with large, time demanding, complex decision issues since these were more individual and special in character and it was difficult to work out general routines in the decision making for these issues.

The opinions about the advantage of structure in the form of formal procedures at the preparations contra the advantage of flexibility associated with the

procedures used today was very different. Approximately half of the respondents found no problems with the way preparations of decision issues worked today and the other half would like to see a more formal form of decision making process where the preparations of issues as well as the final decisions were created according to some sort of formal standard.

On the question whether the FGSE used any kind of organizational memory the answer was that they only used the formal protocols which were produced by the secretary and later authorized by the FGSE. The preparations of issues were not saved for later reference, unless there was some kind of formal responsibility to do so (for example, regarding economic matters). For the decision makers it was up to each and every one of them to "save" parts of preparations he or she was a part of in the form of e-mails regarding the issue and documents used during the preparation.

An advantage with the documenting of decisions in protocols was, according to the respondants, the fact that this form of documenting was obligatory, and therefore had to be done, and that it was possible to document the decision issues according to a formal standard.

Disadvantages with the current use of documentation was, in the respondents view, the problem of searching the documentation and the difficulties involved in getting a perspective of issues representing some kind of "whole". For example, if someone wanted to know how many decisions there had been during a year regarding the employing of new lecturers, that person had to search the protocols for that time span himself, searching for occurances of this kind of decision.

Regarding the use of an organizational memory in the form of our sybsystem the decison bank, the respondents were optimistic. This subsystem was, according to a majority of the respondents, the most relevant subsystem of the ODSS prototype which could support them. They saw a need of this subsystem or a similar solution since decisions having similar characteristics today were made more or less in total isolation from each other. However, the respondents saw a practical problem in the use of the decision bank or a similar system in that it was dependent on the users writing down their experiences before they were saved for future use. In most of the respondents views, this was too time demanding and would therefore not be practically possible.

Again we argued that the forum could be used for this purpose and stressed the advantages of using the discussion forum and the decision bank in parallell since the discussions before an issue (for example, the e-mail communication the members of the FGSE used today) could be held on the forum and later these messages could be saved in the decision bank in an anonymized form. Since we had created a close connection between these two subsystems it would be easy

to store the discussions held before a decision was made in the decision bank as well as in the decision card which represents the final decision.

Some of the respondents agreed to this, but others meant that this would mean that *all* preparations of an issue must be held on the discussion forum. Otherwise the content of the decision bank would only reflect parts of the preparations and be incomplete. The discussions regarding this issue ended here due to the fact that the meeting break of the FGSE was over and the respondents would have to continue their meeting.

Just before the respondents would continue their meeting after the break, we had the possibility to smalltalk with the secretary of the FGSE who recommended us to arrange a presentation of the ODSS with another decision making body with connections to the work of the FGSE in which she was a member helself, - the Administrative Faculty for Social Sciences, AFSS.

According to her, the members of the AFSS were more practically involved in the preparation of issues which were later to be decided on within Gothenburg University and the members of this administrative decision body also had more practical computer experience than the members of the FGSE and therefore probably would have better possibilities to adapt to the kind of system we had constructed. After the presentation, we therefore arranged a new presentation of the system for the AFSS which is described in section 8.2.4.

The presentation for the FGSE was fruitful in that the discussion with the respondents about the way the FGSE functions as well as about how they would like it to function with regard to their making of decisions and their use of an organizational memory had given us new insights. However, the discussion with the respondents was too short and was interrupted before we had wanted to finish it and we felt that the positive comments about the system probably, to some degree, was a result of courtesy and not solely objective criticism. Some general facts about the presentation is given in table 8.2 on the next page.

At the presentations we had handed out a questionary (see Appendix I and section 8.2.4) which we hoped the respondents would answer as soon as possible.

8.2.3 The presentation for the AFSS

The presentation for the AFSS took place at a small conference room they had available where we could use our portable projector in order to show the system during the presentation. Apart from a short theoretical introduction by Faramarz Agahi, the presentation was conducted in the same manner as the previous

presentation we had had for the FGSE, with a short presentation of the system and our ideas before we held a discussion with the respondents about their way

Table 8.2 The presentation for the FGSE

Locaction:	"Malmstensvåningen", a conference room at the Gothenburg School of Economics.
Respondents:	11 (of a total of 14) members of the Faculty for Gothenburg School of Economics.
Time for presentation:	appr. 10 minutes
Time for discussions:	appr. 20 minutes
Presentation form:	Portable, Internet connected computer and a portable projector.
Documentation:	Yes, to all respondents present (systems manual).
Participants from the master thesis group:	Jörgen Fredman, Mathias Horndahl, Lars Tong Strömberg

of making decisions and their use of communication techniques and ways of documenting experiences achieved during the decision making.

Compared to the previous presentation for the FGSE, the discussion which followed the presentation for the AFSS was more lively and more critical in character. Each and everyone of the respondents took part in the discussions and we sometimes had to manage the turn-taking between the respondents in order to achieve a discussion where every respondent who wanted to give a comment should have the possibility to do so.

As with the discussion we had had with the FGSE, the discussion with the AFSS began with our questions to the respondents about how they comprehended their decision making was and functioned and how a normal decision issue was handled in the organization.

A first issue which was subject to debate was the organizational position of the AFSS in the organizational hierarchy of Gothenburg University and the relations between the AFSS and the FGSE and other decision bodies on a faculty level in Gothenburg University. The respondents had different opinions about this and we had to conclude that discussion by simply moving on to the next discussion topic without having achieved any clarity about how the organizational structure exactly looked like.

Next we moved on to questions about the decision making itself and according to the respondents the decision making in the AFSS is of a more administrative character than the decision making in, for example, the FGSE. The secretary of the FGSE, who also was a member of the AFSS, was the main communication channel between the two decisive bodies and her role in the exchange of information regarding decision issues was stressed.

According to the respondents, decision issues for the AFSS could be initiated within the organization itself or come from other sources within the University as well as from external sources. However, most of the decision issues regarded internal, administrative issues concerning the social science institutions of Gothenburg University handled by the Faculty for Social Sciences and issues regarding special forms of cross-research collaborations between institutions, handled by a decision body termed "Temanämnden". In Temanämnden, institutions subordinate the School of Economics are represented as well as other institutions from other faculties under Gothenburg University.

In general, the initiation of decision issues for the AFSS could take place either on a higher lever by, for example the board of Gothenburg University, on a lower level by institutions under the AFSS or from other decisive bodies on the same level in the organizational hierarchy, for example the FGSE. The respondents agreed that the decision making process in general can be likened to the kind of funnel Minzberg et al. (1995) proposes and which is described in chapter 4, where the decision subject is negotiated until a general agreement can be reached.

As with decision issues in the FGSE, decision issues are prepared in the AFSS using mostly e-mail and telephone communication. However, since the members of the decisive body physically are located close to each other in the same building, it is also common practice to exchange decision information and communicate face-to-face during breaks and simply by meeting other decision makers belonging to the AFSS in the building.

Although most respondents were satisfied with the current practices of using e-mail as a communication means they were also interested in the communication possibilities we had showed them during the presentation of the ODSS. In the

respondents view, the forum and the possibilities of saving information about decisions, would probably be most useful for the kind of routine decisions they had. These decisions are, for example, decisions regarding economic matters such as budgeting and salaries which are made for the different institutions under the AFSS and the cross-institutional cooperation taking place under Temanämnden.

According to the respondents, decisions of this kind were often repeating and it was difficult to find the information about previous, similar decisions quickly. Also, sometimes it was not clear as to who would be the best person to contact in order to get help in finding information about the issue. At these times, instead of having to mail all people at the AFSS in order to find out if someone have the information, it would be useful to use the forum and have ongoing discussions and an exchange of information there.

In general, the discussion about the forum with the members of the AFSS focused more on the communicational aspects than was the case with the FGSE. In general, we got the impression that the members of the AFSS were more experienced of using and interested to learn about new communicational possibilities than were the FGSE. This was also the case according to the secretary who had experiences from both of the decisive bodies. Also, according to the respondents, the kind of decision making that the AFSS had, required more intensive communication with lots of e-mail traffic than they thought the FGSE had which made the communicational abilities of our system especially interesting for them.

The communicational aspects of using the agenda also lead to a long, intensive discussion. At first, however, we had to explain the optional uses of the two views in the agenda once again since some of the respondents found it confusing that the same information was contained in both views.

The responses concerning the agenda was very positive. This was because the decision information which the AFSS exchanged, especially downwards in the organization towards the institutional level, often is in a schedulized, time dependent form.

For example, the whole budgeting process which the AFSS and Temanämnden supervises for the institutions is scheduled in the form of several deadlines before which different parts of the process should be achieved. The information about how and when this budgeting work are to proceed, is managed by the AFSS by using printed information material distributed with internal mail. Since this kind of procedure takes a lot of time and is slow as well as it costs a lot due to the large costs of printed paper, the respondents found the agenda as an interesting way of getting rid of this paper work.

However, the information flow downwards from the decisive body to the institutions under it, was not something we had planned for in the system development of the agenda and the forum since the system as a whole is password protected. However, the requests of the respondents would be easy to implement in that different parts of the system easily can be adjusted to the users needs in the form of password protection. Consequently, the members of the AFSS would rather see a division of the ODSS into, not only an internal part divided into projects and decision subjects, but also an official part through which communication can be held with external parties without letting them have access to sensitive information.

As with the forum, the respondents saw most use of the decision bank for routine issues which they wanted to find information about fast and where the information needs were similar from time to time. The problem today when dealing with routine issues is that it is time demanding to search for similar, previously made decisions. Today, these are documented on printed paper in files where the decision makers manually has to search for them. By using the search facilities which are available in the decision bank, it would be possible to achieve efficiency gains regarding the search for similar, previously made decisions.

As for the issue of anonymization, the respondents agreed that in general anonymization can make groups of decision makers focus more on the decision issue in itself and not on the decision makers and who afterwards made the right or the wrong decisions. However, they also argued that anonymization probably was more suitable in situations where the same group of decision makers all the time made the decision making together so that they all decision makers were responsible for the decisions of the group.

The decision making in the AFSS however, sometimes were made by the whole group of decision makers, sometimes by only a few decision makers when the decision matter was not so important or when the issue regarded a certain field of knowledge these particular decision makers had. In these cases the responsibilities for the decisions should lie at the decision makers who had made the decision and not be a responsibility of the whole group.

This disadvantage of the managing of decision information today were, according to the respondents, especially obvious when someone who is not familiar with the work of the AFSS works with administrative issues he or she has no previous experience with during a limited time. At these times the person who has not the experience needed, does not know where to search for similar, previously made decisions since he or she has to use the files someone else has been

responsible for and it therefore may take time before the person becomes efficient in this kind of routine decision making.
What kind of support for their decision making do the AFSS have today then? As for the documentation of preparations and made decisions the routines are similar to the routines of the FGSE, i.e. the decision makers themselves are responsible for the saving and documentation of information concerning the preparations of issues. Final decisions are however documented in the form of written documents according to a set standard.

In general the respondents thought the prevailing system is advantageous through its flexibility regarding communication which can function either through use of e-mail, telephone or by face-to-face meetings. However, the support for quick communication where all decision makers are involved is difficult to achieve by these communicational means apart from face-to-face meetings. In these cases, as well as for documentation and organizational memory for routine issues, the ODSS we suggest would be useful.

Table 8.3 The presentation for the AFSS

Locaction:	A conference room at the Administrative Faculty for Social Science.
Respondents:	10 (of a total of 12) members of the Administrative Faculty for Social Science.
Time for presentation:	appr. 15 minutes
Time for discussions:	appr. 40 minutes
Presentation form:	Portable, Internet connected computer and a portable projector.
Documentation:	Yes, to all respondents present (systems manual).
Participants from the master thesis group:	Supervisor, Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong Strömberg

After the presentation, we handed out questionaries (see Appendix I) to the respondents and we also got the possibility to arrange an individual interview with one of the members of the AFSS (also secretary in the FGSE). Before the interview, she would prepare answers to the questions we posed in the questionary so that we could discuss those issues in more detail at the interview.

Some general information about the presentation for the AFSS is given in table 8.3 on the previous page.

8.2.4 The questionaries used with the FGSE and the AFSS

At the presentation for the FGSE and the AFSS we had prepared a questionary which was handed out to all present 11 members of the FGSE after the presentation (see Appendix I). At the presentation for the AFSS, we used the same questionary as for the FGSE and handed this out to the 10 members present (the AFSS has a total of 12 members).

The questionary, which is qualitative in character, contains questions about the decision making in the organization as well as uses and preferred uses of knowledge management and organizational memory. In order to facilitate the handing in of the questionary, we handed out self-adressed internal envelopes used within Gothenburg University to all respondents so that it would be easy for them to just fill in the questionary and mail it back to us.

Apart from the information corresponding to discussions at the FGSE and the AFSS, which we already had got during the presentation, the following points from the two questionaries (one from the FGSE and one from the AFSS) which were handed in are worth mentioning:

First, on the question about how a subject is initiated and brought to the agenda of a meeting, the respondent from the FGSE answered that issues, apart from the ways which were described during the discussion during the presentation, also can be initiated without any preparation instantly at the monthly meetings under the subject of "other questions".

Regarding if there are any priority based selections made among the subjects preceeding a meeting, and if so, who makes them, the respondent from the FGSE meant that the Decanus (the chairman of the board) and the secretary of the FGSE have important roles as for which decision issues are prioritized and selected for the meeting.

On the question about how a subject is initiated and brought to the agenda of a meeting, the respondent from the AFSS answered that a categorization into four

categories of initiations can be done in this regard. First, an issue may be initiated "from above" from the board of the University or from the Principal. Second, the institutions could initiate issues to be decided on by the AFSS. Third, individual employees or students could initiate decision issues and fourth, the Decanus could take the initiative to the making of decisions in issues he or she see as important.

8.2.5 The interview with a member of the FGSE and the AFSS

The interview with the person who simultaneously was a member of the FGSE and the AFSS and who we had arranged an interview with after the presentation for the AFSS, was held at the Institution for Informatics in one of the conference rooms. At the interview, our plan was to deepen our understanding of the decision making process at the FGSE and the AFSS on basis of the broad discussion we had had at the two presentations and the questions in the questionary.

Apart from deepen our understanding, the purpose of this interview was to contrast the practices in the FGSE and the AFSS with some of the theories on which we base this thesis on. Due to time constraints we had not had the time to present the theories in detail at the presentations and discuss the practices of the two decisive bodies by contrasting these with the theories.

Regarding the decision making process in the FGSE and the AFSS, these according to the respondent to are high degree corresponds to the funnel model proposed by Langley et al., 1995 (cf. figure 4.4), i.e. the decision making process is in general progressing from a stage of discussions and preparations where different opinions try to "steer" the issue towards their preferences. However, according to the respondent, this process is different depending on the characteristics of the decision issue, the number of decision makers involved and which decision makers were involved.

Regarding the characteristics of the decision issue, an advanced, complex issue, according to the respondent, often demands more time for preparations and the opinions about the issue tends to be more diverse. Often the outcome of this kind of issue could lie on a continuum of different choices but sometimes there is a choice between either of two alternatives. Often when the issue to decide on concerns a choice between a number of alternatives, the group of decision makers are divided into subgroups with proponents corresponding to those alternatives. If there is a choice between a couple of alternatives and the decision groups cannot agree on a solution, the matter is often settled democratically by votation.

In general there are more complex issues which take long time to prepare at the FGSE. These issues often are very qualitative in nature and it is very difficult to evaluate the decisions afterwards, i.e. to say whether the decisions were wrong or right..

At the AFSS, on the other hand, there are many routine issues to decide on. These issues often take shorter time to prepare and it is more often possible to distinguish correct decisions from incorrect decisions. For example, decisions regarding economic matters often can be judged according to if they were correct or not afterwards.

As for our idea of using the decision card as an endpoint in the decision making process (see figure 7.4), the respondent was very enthusiastic. Especially, support in the form of search possibilities in order to be able of finding similar, related previously made decisions would be of great use for the FGSE. She said that when we had described the decision card the first time, she had thought of it as a form of protocol documentation form which was static.

After the presentations, she had understood that the decision cards in fact can be very flexible in use, for example through the possibilities of including hyperlinks, attached documents and e-mail links directly in the text in the different fixed fields in decision card. In this way they set a stable standard for the structure of the decision making but on the same time they make it possible to organize the decision information in a very flexible form, where different related decisions which are similar in character can be linked through the use of the decision bank.

The respondent was especially positive regarding the "consequences-" and "who-does-fields" in the decision cards. According to her, she had many times experienced that decisions had been made but without considering the consequences or who should carry out the decision.

Although these issues are closely related to the making of decisions they were according to her, often neglected in the decision making since the decision makers themselves often do not have carry out the decisions or experience the direct consequences of the decisions. By using the decision card as a basis for the structuring of decisions, she thought that more attention would be paid to these issues and that they would not so easily be neglected by the decision makers.

Regarding the division of possibilities of steering the debate in the forum in the form of projects and decision subjects the respondent argued for a more structured approach regarding the creation of decision subjects.

Although she had not used other discussion forums on the Internet and was not experienced with how such forums work, she thought that for the kind of communication which concerned decision making in the two decisive bodies from which she was experienced there would be a need of having a coordinator for the discussions who could make sure that the decision subjects were consistent so that there would not be the same discussion in several threads which were named differently.

Also, she thought that the issue of anonymization of subjects would suit the decision making of the FGSE better than the AFSS since the FGSE works more as a group than the AFSS which had more decentralized decision making where

Table 8.4 The interview with the member of the FGSE and the AFSS

Locaction:	A conference room at the Institution for Informatics.
Respondents:	A person who is simultaneously a member of the FGSE where she is working as the secretary and the AFSS where she is working as an ordinary member.
Time for presentation:	appr. 20 minutes (explanation of ideas and theories)
Time for discussions:	appr. 100 minutes
Presentation form:	Overhead and whiteboard.
Documentation:	No.
Participants from the master thesis group:	Supervisor, Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong Strömberg

it sometimes was important to have references to the concerned decision makers after the decision has been made. An example of issues where this is true, was according to the respondent, economic issues which would later be followed up

and where the different members of the AFSS had different areas of responsibilities.

Some general information about the interview is given in table 8.4 on the previous page.

8.2.6 Analysis

The data collections

Of the data collections described, we are satisfied with the two presentations at the FGSE and the AFSS and the discussions we had with the respondents after the presentations as well as the interview with the member of the FGSE and AFSS. However, the data collection at the FGSE and the AFSS using questionaries did not turn out as expected.

To our disappointment, only one of the questionaries handed out to the FGSE and the AFSS respectively was returned which equals an answering frequency of 9,1% and 10%. Of course this can be considered as a very poor result and a very poor basis upon which scientific research should be based on.

When analyzing this outcome, we have come to the conclusion that this poor result might be an outcome of two factors, - the content and timing of the questionaries and the interest of the respondents.

Concerning the content and timing aspect, we base this conclusion on the fact that the empirical research using questionaries we later used with SKF turned out a lot more successful. With SKF, we did not get the opportunity to be present at any of their meetings and therefore could not have the kind of group interview in the form of discussions we had had with the FGSE and AFSS. With both the FGSE and the AFSS, we had discussed the issues that the questionary dealt with *before* we handed out the questionaries. (At SKF, we handed out questionaries first and arranged individual interviews later.)

Possibly this made the decision makers of both the FGSE and the AFSS uninterested in filling in the same information as they already had discussed with us after the presentation.

The other possible cause for the low answering rate we can see regards uninterest in the study and therefore a low interest of filling in and sending back the questionary. All of us had a feeling at the presentations and in our contacts

with the respondents from the FGSE and the AFSS that probably they were not so interested in our research. Perhaps this was a manifestation of what Repstad (1993) calls "research tiredness".

Also, at SKF, we "thanked" for the answering of the questionaries in the form of a free coffee for those decision makers who handed in the questionary. This was not done with the questionaries for the FGSE and the AFSS. Possibly this also had an impact on the huge differences regarding answering rate between the two empirical studies.

However, since the questionaries used with the FGSE and the AFSS were used more or less only as "reference-material" to the discussions we already had arranged with these groups of decision makers, i.e., we wanted to see if any new information not spoken out in the discussions with the respondents during the presentations would be the result of the questionaries, the low answering frequency was not of crucial importance for the empirical result as such.

The results of the empirical research

As for the issue of how decisions are made in the organization, the empirical research at the FGSE and the AFSS indicate that the decision making in the form of preparations of decision issues and bargaining and politics about what decisions should be made at large corresponds to the funnel model proposed by Langley et al. (1995) and the development of the funnel model we present in figure 4.8.

However, as we learnt from the interview with the member of both the FGSE and the AFSS, the funnel may work differently under different circumstances, depending on what kind of issue is to be decided on, the complexity of the issue and characteristics of the decision making and the decision makers. This therefore might be an indication that our model of the decision making process corresponds well to reality.

In this regard, the AFSS seems to deal primarily with issues which can be categorized as simple tasks and problem tasks in Zigurs & Buckland´s (1998) terminology. For them, the communicational aspects of support of the decision making are most important and the issues more often than at the FGSE focus on trying to find an ultimate solution.

For the FGSE, on the other hand, the issues seems to be more of the kind which Zigurs & Buckland´s (1998) categorize as decision and judgement tasks. Issues in this category focus on finding a solution which best satisfies multiple and

potentially conflicting outcomes and the communicational support need is low, but the information processing need is high.

Regarding the support for the decision making the empirical study indicates that different kinds of support for the decision making process is needed. In a decision situation where the issue to be decided on is a simple, routine issue, a structured approach is preferable since the decision making process is more similar from decision to decision than if the decisions are characterized by complexity and time demanding preparations. In this regard, therefore, the discussion forum subsystem seems to be more useful for decision practices which are common at the AFSS and which are simple, routine and recurring.

There are no group decision support systems in use today in any of the decisive bodies FGSE and AFSS in the organization. The communication between the decision makers are of four main categories in both the decisive bodies, - e-mail, telephone, face-to-face meetings and internal mail.

Probably the uses of these communicational means are due the fact that they are the available forms for communication that the decision makers can use without spending money especially on communication. Since the members of the both decisive bodies, at least according to our impression, seem to have relatively low technical skills, one reason for the use of these ordinary communication means is that they are familiar for all of the decision makers.

Apart from documentation in the form of protocols over made decisions, there is no form of management of information and knowledge in the form of any organizational memory used by the two decisive bodies. The preparations of the decision issues are volunteerily saved by the involved decision makers and in order to access information about previous decisions, one must search through the files where the protocols are stored or manage the decision information by oneself.

Concerning preferred use and practices in the decision making and management of knowledge, there were some differences between the members of the FGSE and members of the AFSS. The FGSE were interested in the discussion forum for use by those decision makers who do not have the possibility of being present at the face-to-face meetings. For them the problem of insufficient time for communication and face-to-face meetings is more serious than for the AFSS whose members meet more and communicate more often and also work in the same building.

For the AFSS, on the other hand, the kind of discussion forum we have implemented in the ODSS prototype could be preferred as a means of communication for those decision issues which are simple and routine. In

general, use of a discussion forum was more preferred by the AFSS than the FGSE.

The AFSS also has an information need which implies the use of deadlines and time schedules. Therefore, use of an agenda system similar to the one we have developed in the ODSS is preferred. However, in order to being able of using such communication means as the forum and the agenda efficiently, they should have different authorization levels where it is possible to use one the system either internally, password protected within the group of decision makers, but also as an information tool in the whole organization with public access.

As for the knowledge management part, the decision bank, or a similar organizational system for knowledge management, would be preferred by the FGSE. However, since the FGSE would prefer not to use the discussion forum exclusively for the discussions and preparations taking place before a decision is made, they would need to dedicate time resources especially for writing down the decision information in the decision bank.

The AFSS would prefer to use a system similar to the decision bank, in order to organize simple, routine issues in particular. Here, the rationale for using the system is based mainly on the search possibilities which would enhance the access to decision information concerning these kind of decision issues.

8.3 SKF Technical Service and Maintainance

In the following we will present the second part of the empirical study where we have chosen to study SKF Technical Service and Maintainance (hereafter referred to as SKF TSM), a subsidiary concern of SKF.

In section 8.3.1, we give a short background to the choice of SKF TSM as respondents for the empirical study. In section 8.3.2 - 8.3.4, we describe the data collections from the respondents. Finally, in section 8.3.5, we analyze the responses of the empirical study.

8.3.1 Background

SKF TSM is a subsidiary concern of the ball-bearing manufacturing Swedish company SKF. In the SKF group, SKF TSM is responsible for service concerning maintanance in the form of electrical maintanance, service concerning mechanics and production facilities. The services are given when problems

occur, but also in the form of continous preventing maintanance support in order to decrease costs for machines and other products which are costly to repair.

SKF TSM plays an important role in the group regarding SKF´s "TFO programme" which stands for The SKF Trouble-Free Operation programme (http://products.skf.com). This operation programme consists of a range of different value added services that are intended to increase machine life and thereby reduce total operating costs for the group.

SKF TSM is reorganizing and in the SKF group, SKF TSM has a relatively free position. In the future they might achieve an even more free position and there are plans of constructing a whole new independent company out of SKF TSM. An organizational overview of SKF TSM is visualized in figure 8.2 below.

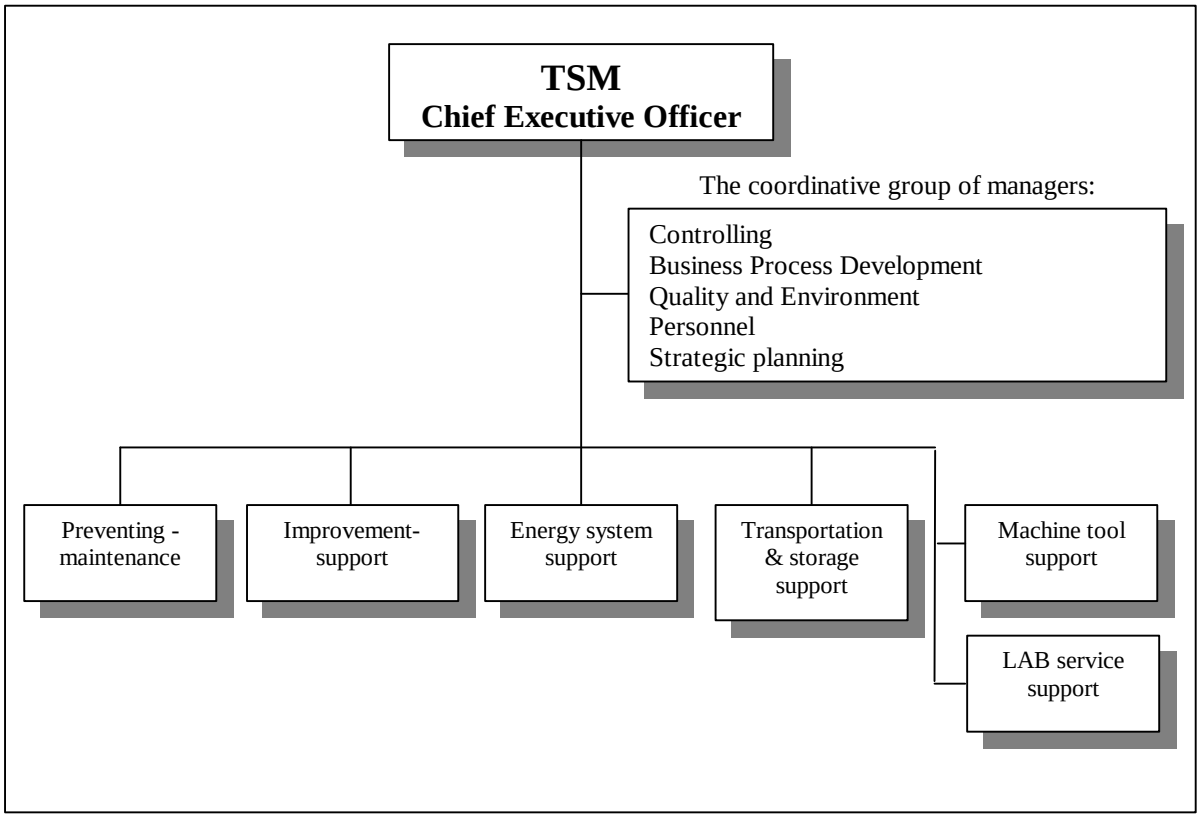


Figure 8.2 SKF Technical Service and Maintainance

The reason we chose SKF TSM as a respondent for the empirical investigation was that one of the members of the master thesis group, - Jörgen Fredman, had worked there and knew some of the decision makers as well as had experiences from the decision making in the organization. Also, we wanted to investigate two organizations from different industries and also in this regard SKF TSM suited us

well. The FGSE and the AFSS are decisive bodies in the state sector and works primarily with education. SKF TSM, on the other hand, is privately owned and works in the manufacturing industry.

8.3.2 The first interview with one of the managers of SKF TSM

The first interview with SKF TSM was with one of the managers in his room at SKF TSM. The interview covered a discussion about the decision making process today, common communication techniques and which kind of tools that are used in order to take advantage of knowledge obtained from previously made decisions.

The respondent first gave an introduction to what his tasks were in the company and what the decisions in the organization usually covered:

In the company, the respondent works as a one of the managers directly under the Chief Executive Officer (CEO). The working tasks he is involved with concerns controlling and coordination of the six smaller departments that SKF TSM consists of and managing of the sales of the six departments. Apart from the managing of these tasks, the respondent is involved in the decision making for the whole of SKF TSM and top management of activities with 9 other decision makers under the CEO, responsible for different functional areas within the company.

Of the decision makers in this top management group, the CEO works as one of the five decision makers in the coordinative group of managers where the respondent also works. Another decision maker in the coordinative group of managers also has a dual responsibility since he also works as the manager for the LAB service support. In the coordinative group, these five decision makers works with controlling, business process development, quality and environment, and strategic planning of personnel. Apart from these five decision makers each of the departments also are represented in the top management group. The top management group therefore consists of totally 10 persons.

The decision making in the top management group mainly concerns qualitative, strategic, long-term decision issues and the group has a face-to-face meeting approximately once per month. At these meetings, final decisions are taken concerning decision issues which have been prepared in the organization so that they are ready to be decided on. In general, issues are prepared primarily by those departments which are affected by the issue and often the decision making is just a verification of practices. This is done in order to make sure that practices in some departments correspond to the overall strategies for the whole company and not interfere with other functions in the company as a whole.

When asked about which of the models of the decision making process the decision making in the top management group best corresponds to, the respondent find similarities with the funnel model advocated by Langley et al. (1995). However, sometimes the decision making is not carried out in such a "smooth" manner as the model implies.

At times, some decision issues can be put on hold, new conditions can arise which have implications for other related issues and decision issues may take longer or shorter time to prepare. Since the decision making of the top management group at SKF TSM mostly concerns coordination of activities, decisions very often influence other decision issues and it is therefore very important to have an overall view of the decision making in order to make the right decisions. In this regard, the respondent also found use of the models 4.6 and 4.7 for an understanding of the decision making in the organization.

Concerning how a decision issue may be initiated, the respondent said that they had agreed upon sending requests for issues to be taken up at the meetings by, no later than two days before the next meeting, and inform the CEO that an issue was ready to be decided on. Of course, it is also possible to initiate decision subjects at the very meeting, however, if an issue that is initiated in this way is too complex or if the opinions about the issue are very opposed, the final decision in the subject can be postponed to the next meeting.

Normally issues that are initiated by others in the organization than those 10 decision makers who make up the top management group, are first discussed with the responsible manager at that level who thereafter initiates the issue at the top management level if he or she finds it necessary. The objective is to decide on local issues locally and only initiate issues which are important or affect other parts of the operations at higher levels.

Often the decision makers who have initiated an issue have prepared the issue thoroughly before the meeting and through informal contacts with the other decision makers and the concerned people in the organization and made a preliminary suggestion as to what the decision about the issue should be. In this way, very few decision issues which are planned to be decided on at the formal monthly meeting cause so much debate that the issue has to be postponed.

On the question if there are any priority based selections made among the decision subjects before a meeting, the respondent answered yes and filled in that most often the person who has initiated a decision issue discuss the priority of the issue with the CEO when he or she makes a request for taking up the issue at the next meeting.

As for the communicational means which are used in order to make decisions in the top management group, the respondent mentioned that the group use three main forms of communication, - the e-mail functions supported by the group support system Lotus Notes, telephone and face-to-face communication. At the face-to-face meetings, the program Freelance often is used for visual presentations among the decision makers in the group.

These means of communication are used randomly depending on what the user finds suitable at the time for the communication. However, final decisions are made exclusively using face-to-face communication at the monthly decision meetings.

Apart from documentation of final decisions and available documentation in the form of preparations, the company has no systematic saving and management of decision information for future use. In general, it is each and everyone´s responsibility to save and manage decision information apart from what is documented on behalf of the whole company in the form of protocols from the meetings which is stored in Lotus Notes and in printed documents in files.

On the question about why such a system not has been introduced, the respondent answered that they had not perceived any need for such a system until now, but since concepts such as knowledge management and organizational memory is discussed in the industry today, there have been discussions about these issues and thoughts about how to improve the management of these issues at SKF TSM.

Regarding our system prototype, which was presented for the respondent in the form of a printed version of the system manual and a verbal summarized desciption of the ideas we have with the different features, he had many opinions.

In general, the respondent liked the idea of using an organizational wide system in which the different decision issues regarding different levels in the organization could be integrated so that an overview of the situation in the organization could be established. Today, there are many local systems in use in the company which have functionality focused on a special area in the organization and different systems are used for different purposes.

An advantage he reckoned with the ODSS prototype we had created was therefore the possibilities to use the system throughout the whole organization and divide the system concerning authorization into different parts so that it could suit different users at different levels and with different functions in the organization.

According to the respondent, this advantage would be most apparent regarding communication in the forum between temporary, interdepartment project teams which could be assigned a common discussion area in the system. This discussion area could then easily be changed as the project evolved and the members of the project team changed due to the possibilities to change the users of a project in the administration subsystem.

The agenda could also be an interesting application for SKF TSM according to the respondent in that it could provide the organization with better possibilities of coordinating their activities. The coordination of activities was one of the main focuses of the top management group and although the respondent thought this coordination worked quite well already, the agenda could be an additional support for this end due to the possibilities of informing of deadlines and important dates in a structured and summarized manner.

However, the respondent thought the agenda would be even more useful if the organization that uses the agenda also has possibilities to use a categorization of information of their own, since the three categories meeting, deadline and other information maybe was not suitable for all kinds of information. Too much information would be referred to as "other information".

As for the decision bank which was the final feature of the ODSS prototype discussed, the respondent was positive to the idea of using decision threads and save the discussions held before the making of a decision in the same file as the decision card. However, he pointed out that in his opinion the success of the decision bank was very dependent on the use of the forum as the only communication form when discussing decision issues. All other forms of communication such as ordinary e-mail and telephone would not be included in the decision bank unless users were willing to write the information from telephone calls in the decision bank which was something he thought would be too tiresome.

This was an important disadvantage with this decision bank subsystem in his opinion although he admitted that it probably would not be possible to implement a system which collected all communication about decision issues in documented form in the same file anyhow.

Some facts about the interview is given in table 8.5 on the next page.

8.3.3 The second interview with one of the managers of SKF TSM

The second interview with SKF TSM was with another member of the top management group of the company. This respondent´s working tasks were

similar to the first respondent, although he worked in another area in the organization with more department specific work tasks and responsibilities.

In general, the second respondent had a similar comprehension regarding the organization of SKF TSM and the decision making process in the company as the first respondent interviewed. According to him, however, the overview of the whole SKF TSM and the coordination of activities related to other departments

Table 8.5 The first interview with one of the managers at SKF TSM

Locaction:	The respondent´s office at SKF TSM.
Respondent:	One of the managers of SKF TSM who were a member of the top management group consisting of 10 decision makers.
Time for presentation:	appr. 10 minutes (explanation of ideas and theories)
Time for interview:	appr. 30 minutes
Presentation form:	Verbal presentation using the systems manual. Quick demonstration of main features on the respondent´s computer.
Documentation:	Yes, systems manual.
Participants from the master thesis group:	Jörgen Fredman

and functions was not as important for him as for the first respondent due to the fact that his responsibilities not affected as many parts of the company as the first respondent.

The decision making process as it is today was, according to the respondent, successful in so far that issues were decided on at the correct hierarchical levels and only such decision issues which were thoroughly prepared was discussed at the monthly meetings of the top management group. However, the respondent thought that some of the decision making was a bit too "ad hoc" and that some structuring of the preparations of issues would be favourable.

The respondent also thought that the made decisions, which were documented in the form of written protocols, sometimes could be a little too summarized and sometimes there were disagreements after a decision had been taken and should be implemented as to what was really agreed upon and what was really the underlying idea of the decision.

As in the first interview, the second respondent saw a problem of the information systems the company had today in that they were too focused and specialized on certain functions in the departments and did not give a good overview of the activities of the company. He said that on the deparmental level this did not matter so much, but in his role as one of the decision makers in the top management group he saw a disadvantage with these kind of small, specialized, unrelated systems in that it was more difficult to coordinate the activities of the whole company when the information contained in these different systems would be compared and presented.

For example, the different systems were not compatible regarding format, so in case the information from the different systems would be coordinated one had to first collect the data from the different systems and then make sure the formatting was compatible in order to use it.

In the respondent´s view, the use of a forum and a decision bank as we had described would open up possibilities for SKF TSM not only to improve the communcation in the company regarding decision issues but also help in setting a structured standard regarding the exchange of information. He said that today the company used Lotus Notes, but although they had a lot of decision information collected in that system, it was unstructured and unrelated due to the fact that nobody knew how to structure it and nobody had the time to do so.

Therefore, Lotus Notes is mainly used for communication purposes today in the form of an e-mail client. In the respontends opinion, the problem regarding knowledge about taken, related decisions today is not that they do not have it stored, the problem concerns how to find the information quickly and easy and how to structure the information.

In this aspect he liked our ideas regarding the decision bank, although he thought that the structuring of the decision issues should be more directed by the administrator than simply by the use of projects. According to the respondent the risk otherwise was that some subjects in the forum would be created and used for communication which do not regard something which should be in the decision bank or that the information becomes duplicated due to discussions about the same things in several decision threads.

He also pointed out that he thought the forum was good for communication and preparation of issues but that final decisions probably has to to be made face-to-face also in the future due to the fact that the communication needs in these situations demanded face-to-face communication in order to make accurate decisions.

Regarding the system as a whole, the respondent saw an important advantage in that it was Internet based and could be easily accessed from a web browser. Many of the current systems in use in the company are accessed via a terminal window and are text based. This makes them difficult to use and it takes a long time to learn how to use these systems. However, since the system is Internet based this also demands a lot from the security due to the strategical importance of the decision information for the company.

A comment regarding a possible improvement of our system concept if it would be implemented at SKF TSM was in the respondent´s opinion to use the system as a basis from which the other systems also could be easily reached, like a so called web portal if this was technically possible. In this way, the system could be used as a point of departure for all members of the organization from which they could reach all important information they had access to in the organization.

Concerning our idea of using the decision card as a form of structuring of final decisions the respondents was positive. Especially the features of the card focusing on what is going to happen after the decision is made are advantageous in that it makes the decision makers think more about the consequences of their decisions and how they are going to be implemented, why and by who. According to the respondent some decisions made today are not specified enough regarding these issues which sometimes leads to disagreements about the decisions at implementation.

On the whole, the communicative and information processing aspects of our ODSS prototype and the overview of the operations and decision information it could provide was what the respondent was most positive about concerning a possible implementation at SKF TSM. The main problem of the decision making today was in his opinion the unstructuredness of the decision making process and the difficulties in coordinating information from different systems.

Some general facts about the second interview is given in table 8.6 below.

8.3.4 The questionaries used with SKF TSM

The questionaries used with SKF TSM were similar to those we had used earlier with the FGSE and the AFSS at the Gothenburg School of Economics. However,

we had chosen to change the formulation of a couple of questions which the respondents of the first two questionaries had had problems in understanding the meaning of.

Table 8.6 The second interview with one of the managers at SKF TSM

Locaction:	The respondent´s office at SKF TSM.
Respondent:	One of the managers of SKF TSM who were a member of the top management group consisting of 10 decision makers.
Time for presentation:	appr. 5 minutes (explanation of ideas and theories)
Time for interview:	appr. 20 minutes
Presentation form:	Verbal presentation using the systems manual.
Documentation:	Yes, systems manual.
Participants from the master thesis group:	Jörgen Fredman

On the first question of how a subject is initiated and brought to the agenda of a meeting, the answers from the questionaries gave the same response as the individual interviews, i.e. questions are in general well prepared before the meetings and decision issues which are to be taken up on the meeting must be notified at least two days in advance. At the meeting, there is also a possibility of initiating decision issues in the form of "other questions". These cannot however be complex questions since such questions must be prepared before the meeting.

Regarding means of communication, only 2 of the 9 respondents (22%) mentioned the use of Lotus Notes. Three categories of communication means most of the respondents mentioned were however telephone, verbal communication during the face-to-face meetings and personal, face-to-face communication before the meeting.

On the question of how long the time span between a subjects initiation and the making of a decision is, the general answer is that this depends on the characteristics of the decision subject. If the decision subject is complex and there are very different opinions about how to solve the issue, it normally takes longer time to make the decision than if the decision subject is simple and routine. In the cases the respondents have answered by giving concrete time spans as for how long the preparations of issues are, these normally range from a half day to two weeks.

On the question concerning if there are any priority based selections made among the subjects preceeding a meeting and if so by who, 8 of the 9 respondents (89%) agreed that there are priority selections being made. The general opinion is that these selections are done by the initiator of the issue and the CEO in combination. 2 of the respondents (22%), however, think that the CEO in general makes this priorities himself without paying attention to the opinions of any of the other top management members.

The pros and cons the respondents see with the current system of making decisions can be summarized as follows: An advantageous feature of the current system which most of the respondents recognize is that everyone in the top management group has the possibility to initiate decision subjects and influence the final decision. The majority of the respondents also think that the current system of making decisions is open and flexible and that the decision making process in general is not unnecessarily time consuming.

Concerning disadvantages with the current way of making decisions, 4 of 9 respondents (44%) thinks that it is too easy for an individual decision maker to be passive and not engage in a particular decision issue. Also, a lot of time at the face-to-face meetings is devoted to informing those decision makers who have been passive about the decision issue and what they are going to make a decision about.

A minority of the decision makers found it difficult to use Lotus Notes and some other respondents thought that the possibilities of initiating "other questions" at the face-to-face meetings are too limited.

On the question of what kinds of routines/systems are used today for saving/documenting made decisions, a majority of the respondents referred to a database system in Lotus Notes where old protocols and agendas are saved. Everyone has access to this documented information, but very few seem to use the system since the information is unstructured.

Another system used for documentation of made decision which is mentioned by some of the respondents is a visual notation board which is located in the conference room where the face-to-face meetings take place.

Regarding discussions before the making of decisions as well as preparations of decision issues, 4 of 9 respondents (44%) mentions that there is a discussion forum available in Lotus Notes but this discussion forum is very seldom used and is only used by a couple of the decision makers. The information in this discussion forum is not structured at all and it is up to the users of this system how he or she wants to structure the information.

Advantages with the existing routines/systems for saving and documenting made decisions and the discussions preceeding them are, according to many of the respondents the ease with which the protocols are written since these only contain information about what has been decided. A majority also finds it easy to find earlier protocols and the information in them.

A disadvantage found with the current system with Lotus Notes is according to some respondents that only a few members of the top management group know how to use it. Another disadvantage relates to the fact that it is difficult to find the "whys" of a decision due to the short descriptions of the decisions in the protocols and the lack of documentation of preparations. A problem identified by some respondents is that it seems difficult to follow up decisions after implementation.

Today the decision makers in the organization can take part in decisions by reading the protoocols from the face-to-face meetings. It is also possible to access the protocols sorted by category, date or responsible decision makers by using Lotus Notes.

On the question of what kind of aids the members of the top management group thought could support their decision making, there were very different answers. One of the respondents found no problems with the existing system. Three respondents saw a need for better search features in order to find previous decisions. Three persons did not answer at all. Worth noting is that one person thought that the competence regarding IT was too low in the company and that something had to be done in order to increase this competence.

Other comments we got from the informants were that some of the respondents considered the present support system in the form of the implementation of Lotus Notes as too bureaucratic and that information about previous decisions actually could be accessed quicker simply by trying to find the information in printed form in files.

Other respondents wanted a support system which is better at keeping track of important dates and deadlines, for example, regarding when a decision should be implemented. A couple of the respondents also wanted to achieve more engagement during the decision making process in general.

8.3.5 Analysis

The data collections

As for the result of the questionary handed out to the decision makers at SKF TSM, the answering frequency was as high as 90%. This can be compared to an answering frequency of 9,1% and 10% for the questionaries we had handed out at the presentations for the FGSE and AFSS.

When analyzing the huge difference regarding the answering frequency between the data collections, there are two main factors which we think might have influenced the result at SKF to the better.

First, as mentioned above, we had not had any presentation and discussion with all the members of the top management group at SKF TSM as we had had with both the FGSE and the AFSS before we used the questionaries. This might have had a positive effect on the result since the respondents were less "research tired" and had not answered the questions we posed before.

Second, we had promised to give those decision makers who filled in and handed in the questionary coffee at the next top management meeting as appreciation for answering the questionary. Possibly, this made more of the decision makers more eager to respond than they otherwise would have been.

Concerning the two individual interviews, we were also satisfied with the data collections. Both interviews had been carried out as planned and we had got a lot of detailed information from the two informants.

The results of the empirical research

Regarding how decisions are made at SKF TSM, the empirical research indicates that the decision making process, in the same way as at FGSE and AFSS in general follows a converging pattern where a decision subject is initiated, often at the department level, is negotiated and prepared and finally is

decided on at the next monthly meeting that the members of the top management group has.

However, the decision making process is seldom smooth and to a large degree depends on the characteristics of the particular issue which is being discussed and the differences in opinion regarding what ought to be decided. Again, this supports our view of the decision making process discussed in section 4.3.3. At SKF TSM, the CEO seems to have a similar administrative function as the secretary of the FGSE and the Decanus concerning the preparations of issues and the making of priority based selections.

However, this procedure appears to be more formal at SKF TSM which has a formal rule that decision issues should progress via a priority based selection by the CEO, often together with the decision makers who has taken the initiative about initiating the issue, before the issue can be brought up to the agenda of the next montly meeting. "Other questions" at the end of these meetings can however be used in order to initiate decision issues immediately for decision, but complex issues cannot be initiated and decided on in this way.

In Zigurs and Buckland´s (1998) categorization of decision tasks, the decision issues at SKF TSM in our view seems to be best categorized as decision tasks. This is so, since the coordination of activities which is a common decision focus at SKF TSM, regards finding solutions which should satisfy multiple and potentially conflicting outcomes for the different departments of the company.

Concerning decision support, Lotus Notes is used throughout the organization. However, difficulties in using the applications as well as an unstructured approach regarding preparations of decision issues and lack of feedback on already made decisions seems to create a need for a different approach regarding support in decision making and knowledge management at SKF TSM.

The diversity of the information and the incompatibilities of special applications used in the organization have created a need for a more unified, easy to use support solution which can give a better overview of the decision making activities than the present support can. Here, an organizational-wide solution such as the one we suggest with our ODSS prototype, might be the answer to this problem. The organization seems to need a system which can be used throughout the organization and can be adjusted to the specific decision information and communicative needs that the organization has throught the use of flexible projects and administration of users.

Although the organization has a form of organizational memory today in the form of Lotus Notes where the decision makers can store decision information, this system seems to lack structure and flexibility in use. For example, many

respondents find the Lotus Notes system too bereaucratic and difficult to access. Also, there are no formal rules of formats regarding the structure of the information contained in this form of organizational memory.

Use of a decison bank system could possibly improve the knowledge management part in SKF TSM in so far that the decision cards in this subsystem promotes a formal structure for the documantation of made decisions which take such things as concequences and feedback on implemented decisions into account. This is something which according to the questionaries is missing in the documentation of decisions. Also, use of a decision bank kind of system can also help in structuring the preparations of the decision issues.

In our view, the main problem in the decision making at SKF TSM might lie in the fact that too much attention is given to the formal decision which are written in the protocols. Far too little attention seems to be given to the structuring of decision information in the form of preparations before decisions are made and feedback and consequences of decisions after the decisions have been made. Therefore, an organizational memory approach which takes more of these factors into account seems appropriate.

8.4 Discussion

Depending on the level of structure and complexity of a decision issue, we have found it possible to categorize decisions and decision information into four different categories, - routine tasks, fuzzy tasks, fuzzy problems and structured problems (see figure 8.3).

Routine tasks are such tasks which often are recurring and which demands low information processing resources for the decision makers. In the empirical study, this kind of decision issues were found primarily at the AFSS. The focus in the decision support for this kind of issues in our view seem to be quick

communication between the decision makers and quick access to previous knowledge. These are the areas which for this kind of issues in our opinion therefore are most important to support.

Fuzzy tasks are smaller problems which are characterized by a low level of structure. Due to to low level of structure, these issues might not be as easily dealt with using previous knowledge since it might be more difficult to find similar previous decisions with the same or a similar structure. Due to the individuality of these issues, the focus in the support should in our opinion be on flexibility in communication between the decision makers and on a structured access to

previous knowledge. The latter in order to facilitate the use of previous knowledge in the decision making, something which otherwise might be difficult due to problems in searching for a similar decision category in the organizational memory.

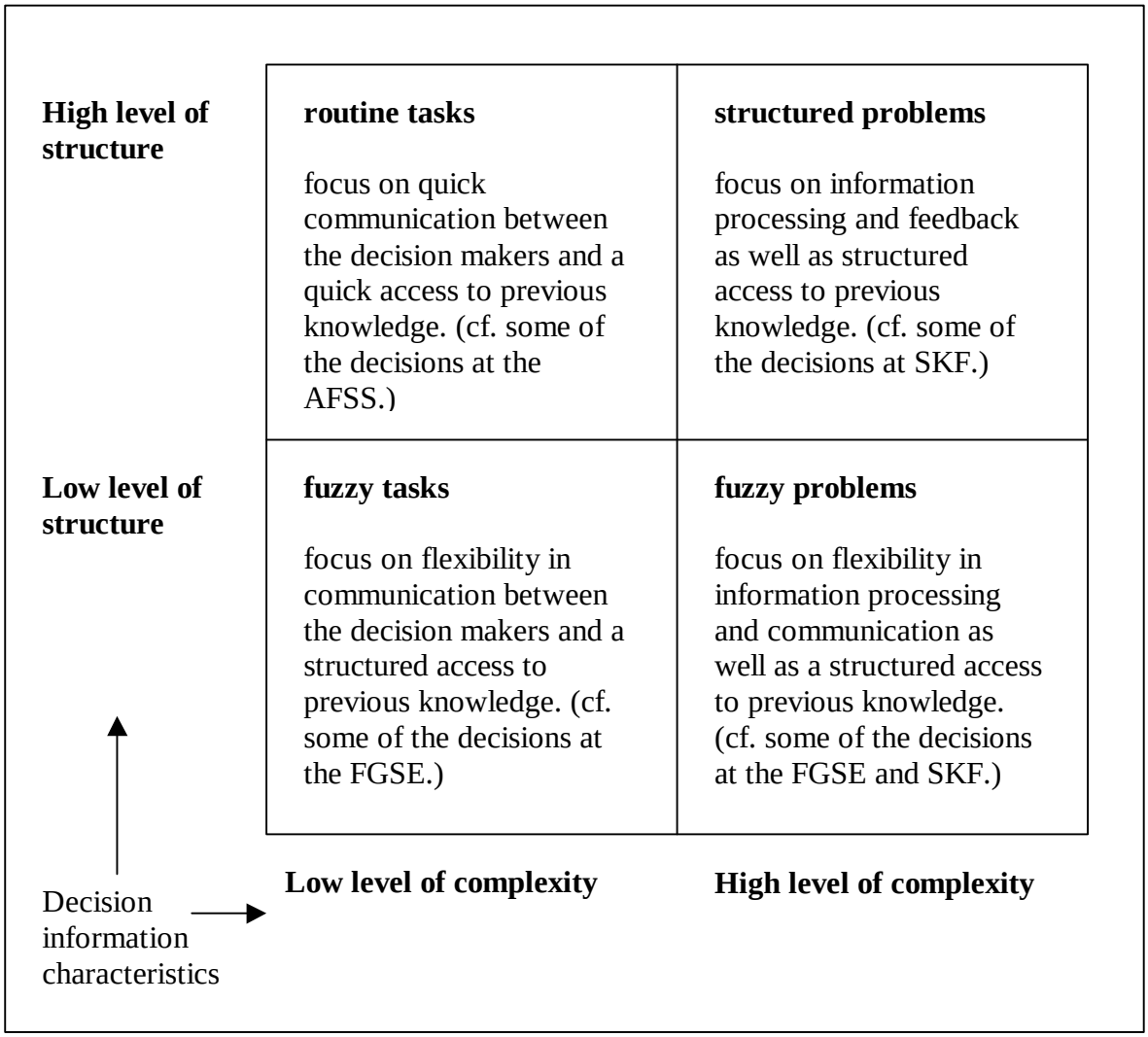


figure 8.3 A framework for the design of organizational decision support systems

Fuzzy problems are decision issues which can be characterized by a higher level of complexity than fuzzy tasks. However, like fuzzy tasks, fuzzy problems also have a low level of structure. In our view, flexible forms of information processing and communication are important support forms when dealing with this kind of issues. This is so, since it is difficult to structure the support given to this kind of issues due to the fact that they are so individual in character. It is difficult to set

up a structured form of decision support if the issues which the decision makers deal with are very different respectively and it is difficult to find common characteristics between the decision issues. Many of the strategic issues dealt with by the FGSE can be referred to this category as well as some of the decision issues at SKF.

Finally, structured problems are problems which in our view can be characterized by a high level of structure and a high level of complexity. Examples of such decision issues are some of the coordinative decision issues as SKF. Here, the issue to a large extent regards operations management and although the issue to be decided on is complex, it is often easy to structure the issue in mathematical terms and solve the problem using quantitative techniques. Here the focus, in our view, therefore should be on information processing support first and foremost. Also, feedback in the form of controls during and after the implementation can help in ensuring that the taken decision was the correct one.

8.5 Suggestions for further research

This thesis has focused on some specific research areas related to organizational decision support and knowledge management and we have based the study on a relatively broad theoretical base due to the practical as well as theoretical character of the study (see section 1.2.1).

In the theoretical frame of reference we have touched on many areas of organizational decision support which could be investigated further and on the whole, the research areas of knowledge management, decision making and communication between decision makers are so broad and general that it should not be difficult to find areas which it is possible to focus more on.

One of these areas regards the behavioural aspects of organizational decision making. For example, influences of behaviours common in organizational decision making such as group think and risky shifts could be investigated more regarding the impact of these group behaviour under different forms of group decision support.

Regarding the development of the ODSS prototype we have developed, we had at an initial stadium of the system development created a subsystem which used SMS when informing users that information in the system had been updated. Unfortunately, the free SMS service we used (www.mtnsms.com) introduced restrictions in the use of free SMS messages and therefore we dropped this feature from the system. However, this as well as ICQ would be interesting areas

to research further and try to implement practically in order to achieve new flexible forms of communicational support in ODSS.

9. Summary

Making the right decisions and being able to learn from past decision making is important for companies and organizations since the decision making to a large extent determine how they can succeed in a competitive market.

The purposes of this thesis, which is a thesis focusing on practical as well as theoretical aspects of organizational decision support, are threefold:

First, as a background to the other research, we have chosen to study some available theories regarding organizational decision making, knowledge management and means of communication techniques which can support organizational decision making.

Second, we have chosen to study organizational decision making in two chosen organizations empirically regarding how decisions are made today, current use and practices of organizational decision support systems, knowledge management and means of communication techniques, and preferred use and practices in these areas.

Finally, we have chosen to build a small, ODSS prototype with cababilities in these areas.

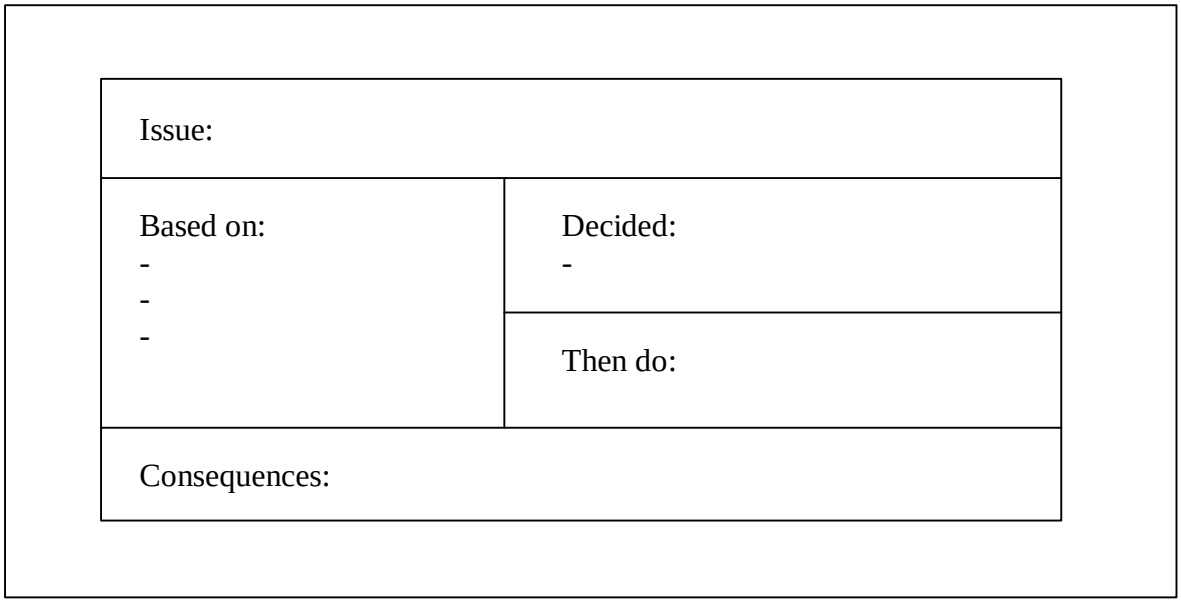


Figure 9.1 The model of organizational memory system data structure (Agahi, 1999)

As for the construction of the ODSS prototype, two important models which we have chosen to base this construction on is Agahi´s (1995) model of organizational memory system data structure (see figure 9.1 on the previous page) and our own development of Langley´s et al. (1995) model of the decision making process where we have incorporated the four subsystems of our system prototype, - the discussion forum subsystem for discussions, the agenda subsystem for scheduled information and coordination during the decision making process, the administration subsystem for steering the process regarding its use and the decision bank for storage of information regarding preparations of decision and the final decisions.

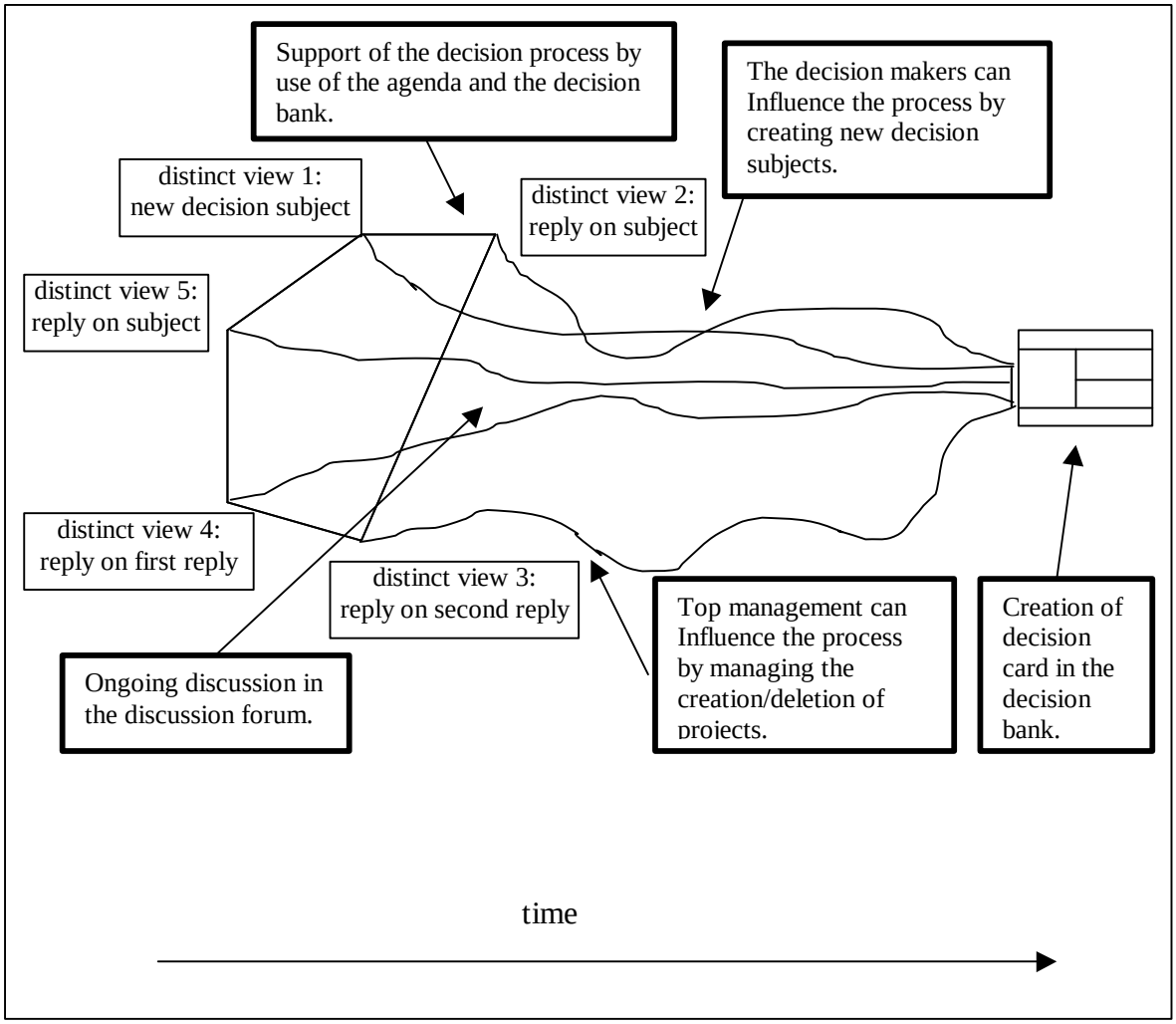


Figure 9.2 The intended influence of the ODSS prototype on the decision making process.

As for the storage of final decisions in the decision bank, these are stored in what might be called decision cards which is a practical realization of Agahi´s model of

organizational memory system data structure (see figure 9.1) where important information concerning the motive of the issue and the consequences of the decision is stored together with the information which regards the decision itself.

The empirical research took place at two chosen organizations with different characteristics regarding industry and ownership. On the whole, the empirical research can be characterized as mostly qualitative in nature using different data collection forms.

The empirical research indicates that the decision making process, in general follows a converging pattern where a decision subject is initiated, negotiated and prepared and finally is decided on. However, the decision making process is seldom smooth and to a large degree the development of the process depends on things such as the characteristics of the particular issue, the differences in opinion regarding what ought to be decided and the complexity of the issue. On the whole, this seems supportive to our view of the decision making process outlined in figure 9.2.

The empirical research also indicate that due to different characteristics of the decision issues in the three decisive bodies studied (two in one of the organizations and one in the other), the preferred focus and the need regarding support for the decision making and preferred communicational means also differs between different decisive bodies.

For example, quick communication and access to information was considered important for one of the two decisive bodies of the first organization investigated when dealing with simple, routine issues.

For the second of the two decisive bodies of the first organization which deals mainly with complex qualitative decisions, communicational aspects were not so important. Here, support for the decision making process in the form of management of aquired knowledge was considered more important.

For the decisive body of the second organization investigated, most decision issues were characterized by a focus on coordination. This resulted in a greater need of overview and scheduling of the decision making process regarding support, especially during the preparations and the following up of decisions.

Depending on the level of structure and complexity of a decision issue, we have found it possible to categorize decisions and decision information into four different categories, - routine tasks, fuzzy tasks, fuzzy problems and structured problems.

Routine tasks have a focus on quick communication between the decision makers and a quick access to previous knowledge. Fuzzy tasks have a focus on flexibility in communication between the decision makers and a structured access to previous knowledge. Fuzzy problems have a focus on flexibility in information processing and communication as well as a structured access to previous knowledge. Finally, structured problems have a focus on information processing and feedback as well as structured access to previous knowledge.

List of References

Articles

Agahi, F., 1999, *The Structure of Policy Making, - a Technology to Support Organizational Consultations*, in Proceedings of the 5th International Conference of Decision Sciences Institute, July 1999, Athens

Belovicz, M.W., Finch, F.E., Pruitt, D.G. & Teger, A.I., 1971, *Comments on the risky shift in group betting*, Journal of Experimental Social Psychology, No. 7, Vol. 1, pp. 81-86

Blackler, F., 1995, *Knowledge, Knowledge Work and Organizations: An Overview and Interpretation*, Organization Studies, No. 16, Vol. 6, pp. 1021-1046

Bruns Jr., W.J. & McKinnon, S.M., 1993, *Information and managers: A field study*, Journal of Management Accounting Research, Vol. 5, pp. 84-109

Burgelman, R., 1983*, A Process Model of Internal Corporate Venturing in the Diversified Major Firm*, Administrative Science Quarterly, No. 28, pp. 223-244

Callaway, M.R., & Esser, J.K., 1984, *Groupthink: Effects of cohesiveness and problem-solving on group decision making*, Social Behaviour and Personality, No. 12, pp. 157-164

Camacho, L.M., Paulus, P.B., Dzindolet. M.T. & Poletes, G., 1993, *Perception of performance in group brainstorming: The illusion of group productivity*, Personality and Social Psychology Bulletin, No. 19, pp. 78-89

Camacho, L.M., & Paulus, P.B., 1995, *The role of social anxiousness in group brainstorming*, Journal of Personality and Social Psychology, No. 68, pp. 1071-1080

Campbell, D.J., 1988, *Task Complexity: A Review and Analysis*, Academy of Management Review, No. 13, Vol. 1, pp. 40-52

Clayton, M.J., 1997, *Delphi: A technique to harness expert opinion for critical decision-making tasks in education*, Educational Psychology, December, No. 4, Vol. 17, pp. 373-387

Cohen, M.D., Marsch, J.G & Olsen, J.P., 1972, A Garbage Can Model of Organizational Choice, Administrative Science Quarterly, No. 17, pp. 1-25

Cooper, W.H. & Gallupe, R.B., 1993, *Brainstorming electronically*, Sloan Management Review, No. 35, Vol. 1, pp. 27-36

Cooper, W.H. & Gallupe, R.B. et. al, 1998, *Some liberating effects of anonymous electronic brainstorming*, April, No. 2, Vol. 29, pp. 147-179

Davenport, T.H. & De Long, D.W. et. al, 1998*, Successful knowledge management projects*, Sloan Management Review, No. 2, Vol. 39, pp. 43-58

Day, G.S., 1994, *The Capabilities of Market-Driven Organizations*, Journal of Marketing, Vol. 58, October, pp. 37-52

Delbecq, A.L. &Van de Ven, A.H., 1971, *Nominal versus interacting group processes for committee decision-making effectiveness*, Academy of Management Journal, No. 14, Vol. 2, pp. 203-212

Dennis, A.R., George, J.F., Jessup, L.M., Nunamaker, J.F., & Vogel, D.R., 1988, *Information technology to support electronic meetings*. MIS Quarterly, December, pp. 591-618

Dennis, A.R., & Valacich, J.S., 1993*, Computer brainstorms: More heads are better than one*, Journal of Applied Psychology, No. 78, pp. 531-537

DeSanctis, G. & Gallupe, R., 1987*, A Foundation for the Study of Group Decision Support Systems*, Management Science, Vol. 33, No. 5

DeSanctis, G., Poole, M.S. & Holmes, M., 1991, *Conflict Management in a Computer-supported Meeting Environment*, Management Science, No. 37, Vol. 8, pp. 926-953

Dickson, G.W. & Patridge, J.L., 1993*, Exploring modes of facilitative support for GDSS technology*, MIS Quarterly, June, Issue 2, Vol. 17, pp. 173-195

Diehl, M., & Stroebe, W., 1987, *Productivity loss in brainstorming groups: Toward the solution of a riddle*, Journal of Personality and Social Psychology, No. 53, pp. 497-509

Diehl, M., & Stroebe, W., 1994, *Why groups are less effective than their members: On productivity losses in idea-generating groups*, In Stroebe, W. & Hewstone, M. (Eds.), European Review of Social Psychology, Vol. 5, Wiley, London, pp. 271-303

DiMaggio, P.W. & Powell, W.W., 1983, *The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields*, American Sociological Review, No. 48, pp. 147-160

Dutta, S., Wierenga, B. & Dalebout, A., 1997, *Designing management support systems using an integrative perspective*, Association for Computing Machinery. Communications of the ACM, Jun 1997, Vol. 40, No. 6, pp. 70-79, New York

Ellis, C.A., Gibbs, S.J. & Rein, G.L., 1991, *Groupware: some issues and experiences*, Communications of the ACM, No. 34, Vol. 1, pp. 38-58

Erev, I. & Roth, A.E., 1998, *Predicting How People Play Games: Reinforcement Learning in Experimental Games with Unique, Mixed Strategy Equilibria*, American Economic Review, September, Issue 4, Vol. 88, pp. 848-882

Forester, J., 1996, *Rationality, Dialogue, and Learning: What Community Mediators Can Teach us About the Practice of Civil Society*, Chapter 11 *in Cities for Citizens*, edited by Douglas, M. & Friedmann, J., 1995, John Wiley and Sons, Chichester

Gallupe, R.B., Bastianutti, L.M. & Cooper, W.H., 1991, *Unblocking brainstorms*, Journal of Applied Psychology, No. 76, pp. 137-142

Garvin, D.A., 1998, *The process of organization and management*, Sloan Management Review, Summer, Issue 4, Vol. 39, pp. 33-51

George, J.F. 1991/1992, *The Conceptualizations and Development of Organizational Decision Support Systems*, Journal of MIS, Vol. 8, No. 3

Gopal, A., Bostrom, R.P., & Chin, W.W., 1992, *Applying Adaptive Structuration Theory to Investigate the Process of Group Support System Use*, Journal of Management Information Systems, No. 9, Vol. 3, pp. 45-69

Goodman, P.S., 1998, *Computer-Aided Systems and Communities: Mechanisms for Organizational Learning in Distributed Environments*, MIS Quarterly, December, No. 4, Vol. 22, pp. 417-441

Gray, P. & Nunamaker, J.F., 1989, *Group decision support systems*, in *Decision Support Systems: Putting Theory Into Practice*, 2nd edn, Sprague, R.H., Jr. & Watson, H.J., eds, Prentice-Hall, London, UK, 1989, pp. 272-287

Grönmo, S., 1982, *Forholdet mellom kvalitative og kvantitative metoder i samfunnsforskningen*, in Holter, H. & Kalleberg, R., 1982*, Kvalitative metoder i samfunnsforskning*, Universitetsforlaget, Oslo

Hackathorn, R.D. & Keen, P.G.W., 1981, *Organizational Strategies for Personal Computing in Decision Support Systems*, MIS Quarterly, Vol. 5, No. 3

Hackbarth, G. & Grover, V., 1999, *The Knowledge Repository: Organizational Memory Information Systems*, Information Systems Management, Vol. 16, No. 5, pp. 21-31

Handschuh, S., Hombrecher, A., Schmid, B.F., & Stanoevska, K., 1998, *Efficient Information Retrieval: Tools for Knowledge Management* In: Reimer, U., 1998, *Practical Aspects of Knowledge Management PAKM 98.* Proceedings of the Second International Conference in Basel, Switzerland

Hansen, M.T., Nohria, N., 1999*, What's Your Strategy for Managing Knowledge?*, Harvard Business Review, Mars/April, No. 2, Vol. 77, pp. 106-117

Hart, P., 1991, *Groupthink, risk-taking and recklessness: Quality of process and outcome in policy decision making*, Politics and the Individual, No. 1, pp. 67-90

Hart, S.L., 1992, *An integrative framework for strategy making processes*, Academy of Management Review, No. 17, pp. 327-351

Ho, T.H. & Raman, K.S. 1991, *The Effect of GDSS and Elected Leadership on Small Group Meetings*, Journal of Management Information Systems, No. 8, Vol. 2, pp. 109-133

Holter, H., 1982, *Data, tolkning og sosiologisk forskning*, ur Holter, H & Kalleberg, R., *Kvalitative metoder i samfunnsforskning*, Universitetsforlaget, Oslo

Hoel, M., & Hvinden, B., 1982, *Om bruk av gruppediskusjoner som samfunnsvitenskapelig forskningsmetode* In: Holter & Kalleberg, 1982, p. 137-147

Huber, G.P., 1984, *Issues in the Design of Group Decision Support Systems*, MIS Quarterly, Vol. 8, No. 3, pp. 195-204

Huber, G.P., 1991, *Organizational Learning: The Contributing Processes and the Literatures*, Organization Science, February, No. 2, Vol. 1, pp. 88-115

Jarvenpaa, S.L., Rao, V.S., & Huber, G.P., 1988, *Computer Support for Meetings of Groups Working on Unstructured Problems*, MIS Quarterly, December, No. 12, Vol. 4, pp.645-666

Jick, T.D., 1979, *Mixing Qualitative and Quantitative Methods*, Administrative Quarterly, Cornell University Press, No. 24

Keen, P.G.W, 1980, *Adaptive Design for Decision Support Systems*, Data Base, Vol. 12, No 1 and 2

Kersten G.E. & Szpakowicz, S., 1997, *A Formal Account of Sequential Decision-Making in a Cooperative Setting*, Fundamenta Informaticae, Vol. 30, No. 3/4, pp. 269-282.

Kersten G.E. & Szpakowicz, S., 1994, *Decision Making and Decision Aiding. Defining the Process, Its Representations, and Support*, Group Decision and Negotiation, Vol. 3, No. 2, pp. 237-261

Kivijärvi H. & Kuula M.,1996, *An Experiment to Apply some Substance-Theories to the Development of an ODSS in a Small Company*. Scandinavian Journal of Information Systems, Vol. 8, No. 1 pp. 89-118

Langley, A., Mintzberg, H., Pitcher, P., Posada, E., & Saint-Macary, J., 1995*, Opening up decision making: The view from the black stool,* Organization Science, No. 6, Vol. 3, pp. 260-279

Lantz, K., 1986, *The prototyping methodology: designing right the first time*, Computerworld, Vol. 20, No. 14, pp. 69-72

Lei, D., Slocum, J.W. & Pitts, R.A., 1999, *Designing Organizations for Competitive Advantage: The Power of Unlearning and Learning*, Organizational Dynamics, No. 3, Vol. 27, pp. 24-39

Linger, H. & Burstein, F., 1998, *Learning in Organisational Memory Systems: An Intelligent Decision Support Perspective*, in *Collaboration Systems and Technology Track*, Vol. 1, 31st Hawaii International Conference on System Sciences, pp. 200-209

Lyles, M.A. & Salk, J.E., 1996, *Knowledge acquisition from foreign parents in international joint ventures: An empirical examination in the Hungarian context*, Journal of International Business Studies, No. 5, Vol. 27, pp. 877-904

March, J.G., 1978, *Bounded Rationality, Ambiguity and the Engineering of Choice*, The Bell Journal of Economics, No. 9, pp. 587-608

McCauley, C., 1989, *The nature of social influence in groupthink: Compliance and internalisation*, Journal of Personality and Social Psychology, No. 57, pp. 250-260

Miller, D., 1987, *Strategy making and structure: analysis and implications for performance*, Academy of Management Journal, Vol. 30, No. 1, March, pp. 7-32

Miller, D., 1996, *A preliminary typology of organizational learning: Synthesizing the literature*, Journal of Management, Special issue, No. 3, Vol. 22, pp. 485-506

Mintzberg, H., Raisinghani, D. & Theoret, A., 1976*, The Structure of Unstructured Decision Processes*, Administrative Science Quarterly, No. 21, Vol. 2, pp. 246-275

Moorman, C. & Miner, A.S., 1997, *The impact of organizational memory on new product performance and creativity*, Journal of Marketing Research, Vol. 34, Issue 1, pp. 91-107

Mullen, B., Johnson, C. & Salas, E., 1991, *Productivity loss in brainstorming groups: A meta-analytic integration*, Basic and Applied Social Psychology, No. 12, pp. 3-23

Nonaka, I., 1994, *A Dynamic Theory of Organizational Knowledge Creation*, Organization Science. Vol. 5, No. 1, pp. 14–37

Nonaka, I. & Konno, N., 1998, *The Concept of "Ba"- Building a Foundation For Knowledge Creation*, California Management Review, No. 40, Vol. 3, pp. 40-54

Nutt, P.C., 1984, *Types of organizational decision processes*. Administrative Science Quarterly, Vol. 29, No. 3, pp. 414-60

Owen, J.M., 1999, *Knowledge management and the information professional*, Information Services & Use, No. 1, Vol. 19, pp. 7-17

Park, W., 1990, *A review of research on groupthink, Journal of Decision Making*, No. 3, pp. 229-245

Pavitt, C., 1993, *What (little) we know about formal group discussion procedures: A review of relevant research*, Small Group Research, No. 24, pp. 217-238

Paulus, P.B. & Paulus, L.E., 1997, *Implications of research on group brainstorming for gifted education*, Roeper Review, June, No. 4, Vol. 19, pp. 225-230

Pinfield, L., 1986*, A Field Evaluation of Perspectives on Organizational Decision-Making*, Administrative Science Quarterly, Vol. 31, pp. 365-388

Polanyi, M., 1996, *The Tacit Dimension*, in Prusak L. (Ed.). *Knowledge in Organizations.* Butterworth – Heinemann, Newton

Poole, M.S., 1995, *Decision development in computer-assisted group decision making*, Human Communication Research, September, No. 1, Vol. 22, pp. 90-128

Poynder, R., 1998, *Getting to the nuts and bolts of knowledge management*, Information World Review, Oxford, April, No. 135

Pukszta, H., 1999, *Forget knowledge management; back to information*, Computerworld, Framingham, May 3, Vol. 33, No. 18, p. 32

Roy, M.C. & Gauvin, S., 1996, *Electronic group brainstorming*, Small group research, May, No. 2, Vol. 27, pp. 215-248

Sabherwal, R. & King, W.R., 1995, *An empirical taxonomy of the decision-making processes concerning strategic applications of information systems*, Journal of Management Information Systems, Spring, Vol. 11, No. 4, pp. 177-215

Sambamurthy, V., & Poole, M.S., 1992, *The Effects of Variations in Capabilities of GDSS Designs on Management of Cognitive Conflict in Groups*, Information Systems Research, No. 3, Vol. 3, pp. 224-251

Shrivastava, P., & Grant, J.H. *Empirically derived models of strategic decision-making processes*, Strategic Management Journal, No. 6, pp. 97-113

Simon, H.A., 1955, *A behavioral model of rational choice*, Quarterly Journal of Economics, No. 69, February, pp 99-118

Sprague, R.H.,1980, *A framework for the development of decision support systems*, Management Information Systems Quarterly, vol.4, pp. 1-26

Stein, J., 1981, *Strategic decision methods*. Human Relations, Vol. 34, No. 11, pp. 917-933

Stein, E.W., 1992, *A Method to identify Candidates for Knowledge Acquisition*, Journal of information Systems, Vol. 9, No. 2, pp. 161-178

Tomer, J.F., 1992, *Rational organizational decision making in the human firm: A socio-economic model*, Journal of Socio-Economics, Vol. 21, No. 2, pp. 85-109

Vogel, D.R. & Nunamaker, J.F. Jr., 1990, *Group Decision Support system Impact: Multi-Methodological Exploration*, Information & Management, No. 18, pp. 15-28

Watson, R., DeSanctis, G., & Poole, M.S. 1988*, Using a GDSS to Facilitate Group Consensus: Some Intended and Unintended Consequences*, MIS Quarterly, No. 12, Vol. 3, pp. 463-478

Weick, K.E., 1996, *Drop your tools: An allegory for organizational studies*, Administrative Science Quarterly, June, No. 2, Vol. 41, pp. 301-314

Weiss, C.H., 1982, *Policy Research in the Context of Diffuse Decision Making*, Journal of Higher Education, No. 53, pp. 619-639

Wierenga, B. & van Bruggen, G.H., 1997, *The integration of marketing problem-solving modes and marketing management support systems*, Journal of Marketing, July, No. 3, Vol. 61, pp. 21-38

Whitley, R.D., 1991, *The social construction of business systems in East Asia*, Organisation Studies, No. 12, pp. 1-28

Zigurs, I. & Buckland, B.K., 1998, *A theory of task/technology fit and group support systems effectiveness*, MIS Quarterly, September, No. 3, Vol. 22, pp. 313-335

Books

Allison, G.T., 1971, *Essence of Decision: Explaining the Cuban Missile Crisis*, Little-Brown, Boston

Ansoff, H.I., 1984, *Implementing strategic management*, Englewood Cliffs, Prentice Hall, New Jersey

Argyris, C., 1993, *On Organizational Learning*, Blackwell Publishers, Cambridge

Argyris, C. & D.A. Schon, 1996, *Organizational Learning II*, Addison Wesley, Reading

Beach, L.R., 1997, *The Psychology of Decision Making, People in Organizations*, Sage Publications Inc., California

Bonczek, R.H., Holsapple, C.W. & Whinston, A.B., 1980*, The Evolving Roles of Models in Decision Support Systems*, Decision Sciences, Vol. 11, No. 2

Bower, J.L., 1970, *Managing the Resource Allocation Process*, IL. Irwin, Homewood

Bradshaw, J., 1996, *Basic Internet Tools, A training workbook*, Open Learning Agency'

Carter, G.M. et al., 1992, *Building Organizational Decision Support Systems*, Cambridge, MA: Academic Press

Chaffey, D., 1998, *Groupware, Workflow and Intranets, - Reenginering the Enterprise with Collaborative Software*, Butterworth - Heinemann, Woburn

Clegg, S., 1989, *Frameworks of power*, Sage, London

Delbecq, A.L., Van de Ven, A.H. & Gustafson, D.H., 1975, *Group Techniques for Program Planning*, Foresman and Company, Glenview

Delbecq, A.L, Van de Ven, A.H. & Gustafson, D.H., 1986*, Group Techniques for Program Planning*, Green Briar Press, Middleton

Eckel, B, 1998, *Thinking in Java*, Prentice-Hall Inc. New Jersey

Ewert, M., 1998, *Datakommunikation nu och i framtiden*, Studentlitteratur, Lund

Flannagen, D., 1997, *JavaScript: The Definitive Guide*, O´reilly & Associates

Frykholm, N., 1997, *Cgi-programmering: Innehåller Även Kurs i Perl*, Pagina

Gibson, M.L. & Hughes, G.T., 1994, *Systems analysis and design: A comprehensive methodol-ogy with CASE*, Boyd & Fraser publishing company

Gray, P. ed., 1994, *Decision Support and Executive Information Systems*, Englewood Cliffs, Prentice-Hall, New Jersey

Gundavaram, S., 1996, *CGI Programming on the World Wide Web*, O´reilly & Associates

Hickson, D.J., Butler, R.J., Cray, D., Mallory, G.R. & Wilson, D.C., 1986, *Top Decisions: Strategic Decision Making in Organizations*, Jossey Bass, Jossey-Bass, San Francisco

Holme, I.M. & Solvang, B.K, 1991, *Forskningsmetodik, Om Kvalitativa och Kvantitativa Metoder*, Studentlitteratur, Lund

Janis, I.L., 1972, *Victims of Groupthink: A psychological study of foreign-policy decisions and fiascoes*, Houghton Mifflin, Boston

Janis, I.L., 1982, *Victims of Groupthink: A psychological study of foreign-policy decisions and fiascoes*, Houghton Mifflin, Boston (second and renewed edition of the original title from 1972).

King, J.L. & Star, S.L., 1990*, Conceptual Foundations for the Development of Organizational Support Systems*, Proceedings of the Twenty-third Annual Hawaii International Conference on System Sciences, Los Alamitos, CA:IEEE Computer Society Press

Kotler, P., 1986, *Principles of Marketing.* Prentice-Hall Int. Ed., Englewood Cliffs, New Jersey

Langlet, P. & Wärneryd, B., 1980*, Att fråga, Om frågekonstruktion vid intervju- och enkät-undersökningar,* Statistiska Centralbyrån, Stockholm

Larson, C.F., & LaFasto, F.M.J., 1989, *Teamwork: What must go right/what can go wrong*, Sage, Newbury Park

Lincoln, Y. S. & Guba, E. G., 1985, *Naturalistic Inquiry*, Sage, Newbury Park, California

Luce, R.D. & Raiffa, H., 1957*, Games and decisions: Introduction and critical survey*, John Wiley, New York

Lundequist, J., 1995, *Design och produktutveckling. Metoder och begrepp*. Studentlitteratur

Lutz, M.A. & Lux, K., 1988, *Humanistic economics: The new challenge*, Bookstrap Press, New York

Merriam, S. B., 1994, *Fallstudien som forskningsmetod*, Studentlitteratur, Lund

Morgan, G., 1986, *Images of Organization*, Sage Publications, New Dehli

Osborn, A.F., 1957, *Applied imagination*, Scribner, New York

Patel, R. & Davidson, B., 1991, *Forskningsmetodikens Grunder, Att Planera, genomföra och rapportera en undersökning*, Studentlitteratur, Lund

Perrow, C., 1986, *Complex organizations: A critical essay*, Random House, New York

Porter, M.E., 1980, *Competitive strategy*, Free Press, New York

Repstad, P., 1993, *Närhet och Distans, Kvalitativa Metoder i Samhällsvetenskap*, Studentlitteratur, Lund

Rosengren, K. E. & Rosengren, P., 1992, *Sociologisk Metodik*, Almqvist&Wiksell, Falköping

Senge, P., 1990, *The Fifth Discipline*, Doubleday, New York

Simon, H., 1957, *Administrative behavior: A study of decision-making process in administrative organization*, Free Press, New York

Simon, H.A., 1983, *Reason in human affairs*, Stanford University Press, Stanford

Simon, H. A., 1960, *The New Science of Management Decisions*, Harper and Row, New York

Sommerville, I., 1996, *Software Engineering*, 5th ed., Addison-Wesley Publishing Company

Sprague R. H. & Carlson E. D., 1982, *Building effective DSS*, Englewood Cliffs, Prentice-Hall, New Jersey

Sprague R. H. & Watson H. J., 1993, *Decision Support Systems: Putting Theory into Practice*, Englewood Cliffs, Prentice-Hall, New Jersey

Theobald, R., 1987, *The Rapids of Change: Social Entrepreneurship in Turbulent Times*, Knowledge Systems Inc.,

Turban, E. & Aronson, J.E., 1998, *Decision Support Systems and Intelligent Systems*, Prentice-Hall International Inc., London

Vroom, V., & Yetton, P., 1973, *Leadership and decision-making*, University of Pittsburgh Press, Pittsburgh

Walker, W.E., 1989, *Differences Between Building a Traditional DSS and an ODSS: Lessons from the Air Force 's Enlisted Force Management System*, Santa Monica, California

Watson, R.T., 1990*, A Design for and Infrastructure to Support Organizational Decision Making*, Proceedings of the Twenty-third Annual Hawaii International Conference on System Sciences, Los Alamitos, CA:IEEE Computer Society Press

Whipp, R. and Clark, P., 1986, *Innovation and the Auto Industry: Production, Process and Work Organization*, Frances Pinter, London

Wiedersheim-Paul, F. & Eriksson, L., 1991, *Att Utreda, Forska och Rapportera*, Liber-Hermods, Karlshamn

Witte, E.,1972, *Field Research on Complex Decision-Making Processes - The Phase Theorem*, International Studies of Management Organization, pp. 156-182.

The Internet

Agahi, F., 1999, The Structure of Policy Making, Http://www.adb.gu.se/~agahi/research.html (acquired 1999-07-25)

Clark, D.D., 1999, *An Insider´s guide to the Internet*, M.I.T. Lab for Computer Science, Http://www.lcs.mit.edu/impact/perspect/9902b (acquired 1999-08-25)

Hilal, G., 1998, *CGI*, Http://komar.cs.stthomas.edu/qm425/98s/hilal2.htm (acquired 1999-08-26)

Harris, D., 1996, *Creating a Knowledge Centric Information Technology Environment*., Http://www.htcs.com/ckc.htm (acquired 1999-07-20)

Harrison, I, 1999, *The hairydog guide to mobile phones, - SMS*, Hairydog Productions, Http://www.hairydog.clara.net/sms.html

Heikkinen, T, 1999, *Wireless Application Protocol*, Http://www.tcm.hut.fi/Opinnot/Tik-111.550/1999/Esitelmat/Wap/wap/WAP.html (acquired 1999-09-03)

Holley, K, 1997, *The GSM Short Message Service*, Http://www.vdheyden.demon.nl/sms/index1.htm, (acquired 1999-09-03)

Kirby, J., 1999, *Alternative to CGI - Developing JDBC Servlet Applications*, Http://sun2.disc.com/home/jdbcserv.html (acquired 1999-08-30)

Knudsen, C., 1999, *Servlets or CGI/Perl?*, Http://www.epresence.com/technews/craig_01.html (acquired 1999-08-30)

Malhotra, Y., 1996*, Organizational Learning and Learning Organizations: An Overview*, Http://www.brint.com/papers/orglrng.htm (acquired 1999-07-23)

Malhotra, Y., 1998, *Knowledge Management, Knowledge Organisations & Knowledge Workers: A View From the Frontlines*, January, Http://www.brint.com/interview/maeil.htm (acquired 1999-06-02)

Newman, B., 1991, *An Open Discussion of Knowledge Management*, Http://www.km-forum.org/what_is.htm (acquired 1999-06-04)

Ng, C., 1996, *A Comparison of the Advantages and Disadvantages of Java*, Http://www.undergrad.math.uwaterloo.ca/~cc3ng/s96.html (acquired 1999-08-30)

Rekve, I., 1998, *Active Server Pages*, http://www.cbe.wsu.edu/~rekve/assignments/group_papers/active_server_pages.htm, (acquired 1999-08-26)

Ruggles, R., 1997, *Knowledge Tools: Using Technology to Manage Knowledge Better*, Http://www.businessinnovation.ey.com/mho/hmtl/toolsrr.html (acquired 1999-07-19)

Scarbrough, H., 1996, *Business Process Re-design: The knowledge dimension*, http://bprc.warwick.ac.uk/rc-rep-8.html, (acquired 1999-07-22)

Stanek, S. 1997*, Proposals for a new Strategic Information Technology Management*, Conference on Inteligent DSS in Management, Wisla 1997 Http://figaro.ae.katowice.pl/~stanek/iswd97en/wisl97.html (acquired 1999-07-11)

Questionary

The following questions concern decision making within the Faculty for the Gothenburg School of Economics. It is our hope that the answers to these questions will aid us in developing a decision support system and give us a deeper insight into your decision making today as well as identifying eventual means of support aiding your decision process.

1. **How is a subject initiated and brought to the agenda of a meeting?**

a) Which are the usual forms of communication that are used to raise a subject to the meeting agenda?

b) Approximately, how long is the time span between a subjects initiation and the making of a decision for that subject?

c) Are there any priority based selections made among the subjects preceeding a meeting, and if so, who makes them?

d) Who have the authority to raise a subject for discussion?

1. **Which pros and cons do you percieve with the way a subject is brought to the meeting agenda today?**

Pros:

Cons:

2. **What kinds of routines/systems are used today for saving/documenting made decisions?**

3. **What kinds of routines/systems are used today for saving/documenting discussions and ideas preceeding a decision?**

4. **Are there any forms of organizational memory used today to facilitate your decision making?**

5. **Which pros and cons do you percive with the existing routines/systems for saving and documenting made decisions and the discussions preceeding them?**

Pros:

Cons:

6. **What kinds of aids do you recon would support your decision making?**

7. **Comments.**

Additional remarks can be sent to: dss98f-2@student.informatik.gu.se

Thank you for your cooperation!

Name:

Questionary

The following questions concern decision making within the top management for TSU, SKF Sverige AB. It is our hope that the answers to these questions will help us with our master thesis at the Institution for Informatics, University of Gothenburg. With this questionary we hope to achive a deeper understanding of how decision making is made today as well as identifying any possible means of support for the decision process.

☐ **Yes please!** I would like coffe at the next top management meeting as appreciation for answering this questionary.

8. **How is a subject initiated and brought to the agenda of a meeting? Is it possible for every person to raise a subject for discussion?**

a) Which are the usual forms of communication that are used to raise a subject to the meeting agenda?

b) Approximately, how long is the time span between a subjects initiation and the making of a decision for that subject?

c) Are there any priority based selections made among the subjects preceeding a meeting, and if so, who makes them?

2. Which pros and cons do you percieve with the way a subject is brought to the meeting agenda today?

Pros:

Cons:

3. What kinds of routines/systems are used today for saving/documenting made decisions?

4. What kinds of routines/systems are used today for saving/documenting discussions and ideas preceeding a decision?

5. Which pros and cons do you percive with the existing routines/systems for saving and documenting made decisions and the discussions preceeding them?

Pros:

Cons:

6. Is it possible today to get information about previously made decisions and if so, how?

7. What kind of aids do you recon could support your decision making (e.g. IT-support)?

8. Comments.

Additional remarks can be sent to: dss98f-2@student.informatik.gu.se

Name:

Thank you for your cooperation!

Enkätundersökning

Följande frågor berör beslutsfattande inom ledningsgruppen för TSU, SKF Sverige AB. Det är vår förhoppning att svaren på dessa frågor skall hjälpa oss i vårt examensarbete på institutionen för informatik på Göteborgs Universitet genom att göra att vi får större inblick i hur beslutsfattandet sker idag och vilka eventuella beslutstöd som skulle kunna förenkla beslutsprocessen.

☐ **Ja tack!** Jag vill bli bjuden på fika vid nästa ledningsgruppsmöte som tack för att jag fyller i enkäten!

1. **Hur kommer en fråga upp på mötets dagordning? Dvs. kan vem som helst få upp en fråga till diskussion?**

a) Vilka kommunikationskanaler brukar användas för att få med en fråga på mötets dagordning?

b) Hur lång tid brukar det ta från det att en fråga initieras till dess att beslut om den fattas inom organisationen?

c) Sker urval och prioriteringar bland de frågor som förbereds? Och i så fall, av vem?

2. **Vilka för- respektive nackdelar ser Ni med det nuvarande sättet som en fråga kommer upp på mötets dagordning?**

Fördelar:

Nackdelar:

3. **Vad finns det för rutiner/system idag för att spara/dokumentera tagna beslut?**

4. **Vad finns det för rutiner/system idag för att spara/dokumentera diskussioner och idéer som föregick tagna beslut?**

5. **Vilka för- respektive nackdelar ser Ni med de nuvarande rutinerna/systemen för att spara/dokumentera tagna beslut och diskussioner föregick dessa?**

Fördelar:

Nackdelar:

6. Hur kan man i dagsläget ta del av/läsa tidigare fattade beslut?

7. Vilka hjälpmedel ser Ni som skulle kunna stödja Ert beslutsfattande (t.ex. i form av IT-stöd)?

8. Övriga kommentarer.

Ytterligare synpunkter kan skickas till: dss98f-2@student.informatik.gu.se

Namn:

Tack för Din medverkan!

Enkätundersökning

Följande frågor berör beslutsfattande inom Handelshögskolans Fakultetsnämnd. Det är vår förhoppning att svaren på dessa frågor skall hjälpa oss i systemutvecklingen genom att göra att vi får större inblick i hur beslutsfattandet sker idag och vilka eventuella beslutstöd som skulle kunna förenkla beslutsprocessen.

1. Hur kommer en fråga upp på Fakultetsnämndens dagordning?

a) Vilka kommunikationskanaler brukar användas för att få med en fråga på Fakultetsnämndens dagordning?

b) Hur lång tid brukar det ta från det att en fråga initieras till dess att beslut om den fattas inom Fakultetsnämnden?

c) Sker urval och prioriteringar bland de frågor som förbereds? Och i så fall, av vem?

d) Vem eller vilka har befogenhet att ta upp saker i Fakultetsnämnden?

2. **Vilka för- respektive nackdelar ser Ni med det nuvarande sättet som en fråga kommer upp på Fakultetsnämndens dagordning?**

Fördelar:

Nackdelar:

3. **Vad finns det för rutiner idag för att spara/dokumentera tagna beslut?**

4. **Vad finns det för rutiner idag för att spara/dokumentera diskussioner och idéer som föregick tagna beslut?**

5. **Används någon form av organisationsminne idag som underlag för beslutsfattande?**

6. **Vilka för- respektive nackdelar ser Ni med de nuvarande rutinerna för att spara/dokumentera tagna beslut och diskussioner föregick dessa?**

Fördelar:

Nackdelar:

7. **Vilka hjälpmedel ser Ni som skulle kunna stödja Ert beslutsfattande i Fakultetsnämnden?**

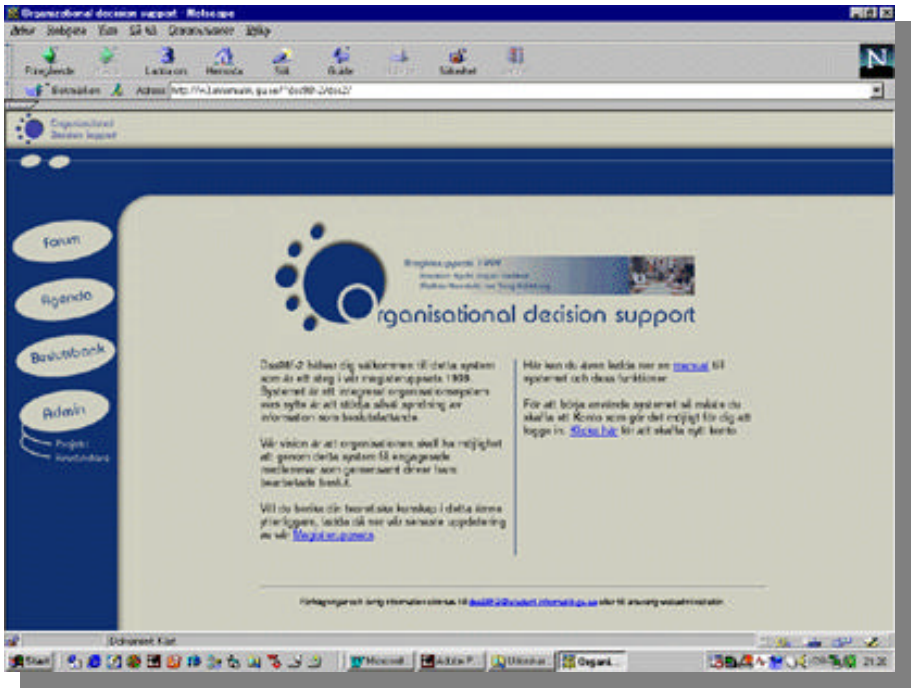
8. **Övriga kommentarer.**

Ytterligare synpunkter kan skickas till: dss98f-2@student.informatik.gu.se

Tack för Din medverkan!

Namn:

ODSS Manual

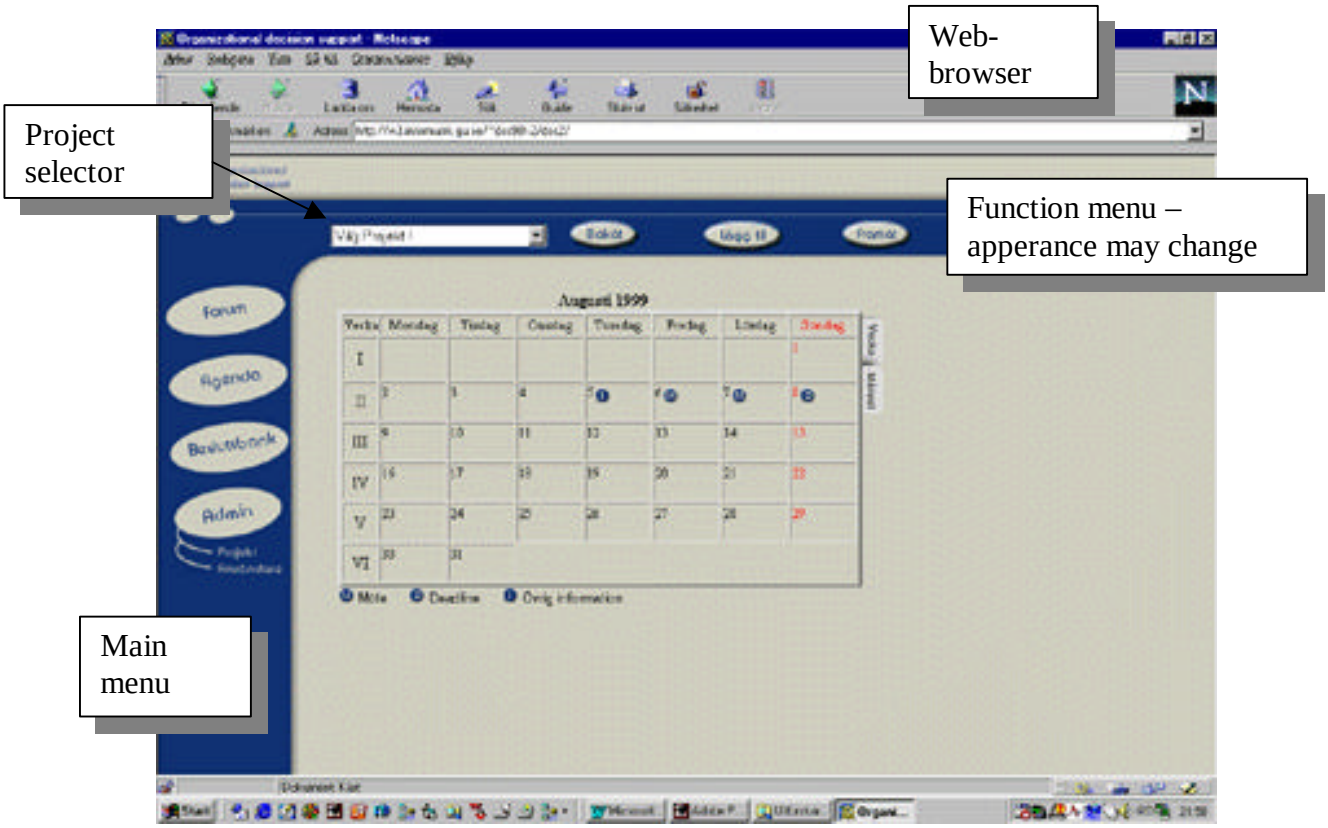

Forum
Agenda
Beslutsbank
Admin
organisational decision support

10. ODSS User Manual

This guide is intended for the regular user of the system. The main objective with this guide is to give the user a guide with illustrations to quickly learn and use the system. Further instructions or help directs to the authors.

10.1 Concepts

Below is a short declaration of some concepts, which will be used in the guide.



10.2 Prerequisite

The system itself can be used in any web browser with access to the Internet, but the browser must support cookies. This can usually can be adjusted in the options menu of the web browser. The browser must also be able to execute

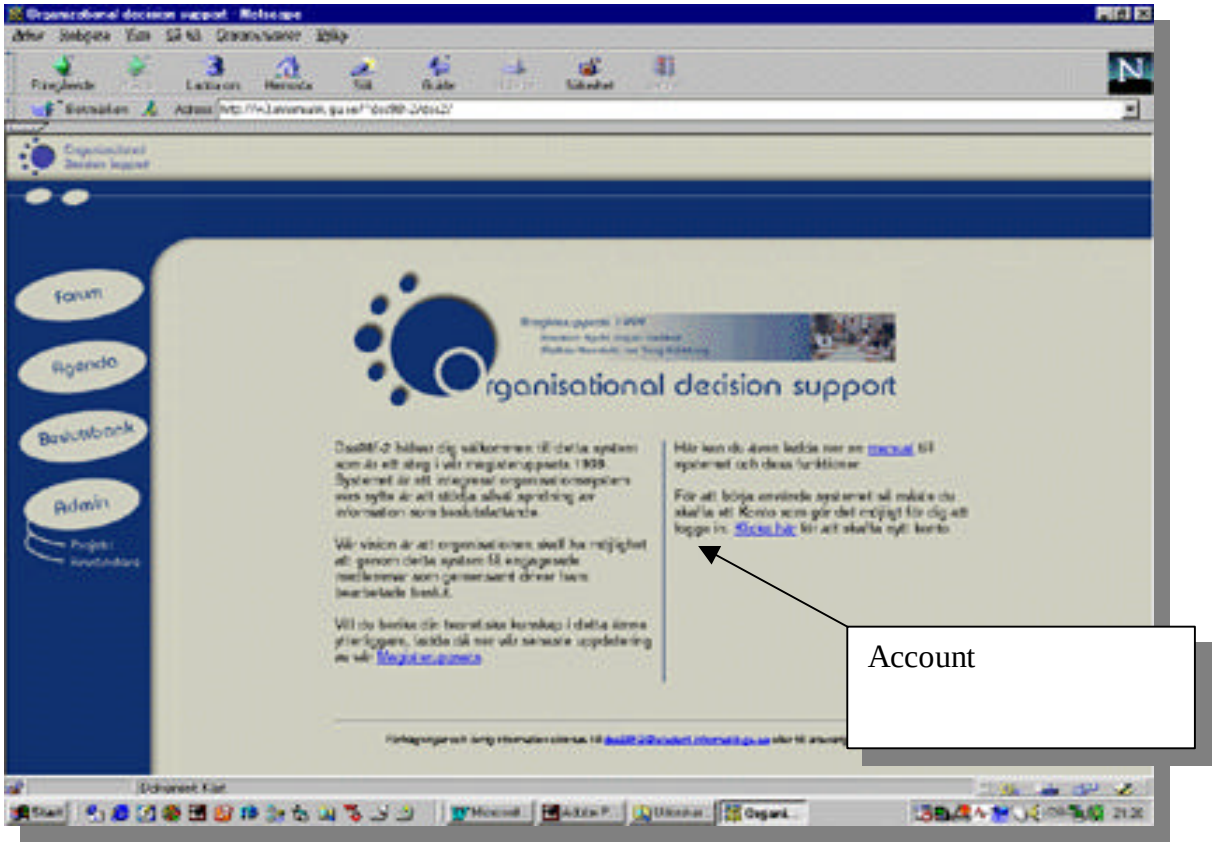
JavaScript, this is normally no problem if your you use a later version of either Netscape or Internet Explorer.

10.3 Quick guide for regular user

10.3.1 Getting a user account

To be able to use the system you must apply for a user account. Only users with exclusive permission can access the information within the system.

Just click on the link shown to the left to get to the submit form

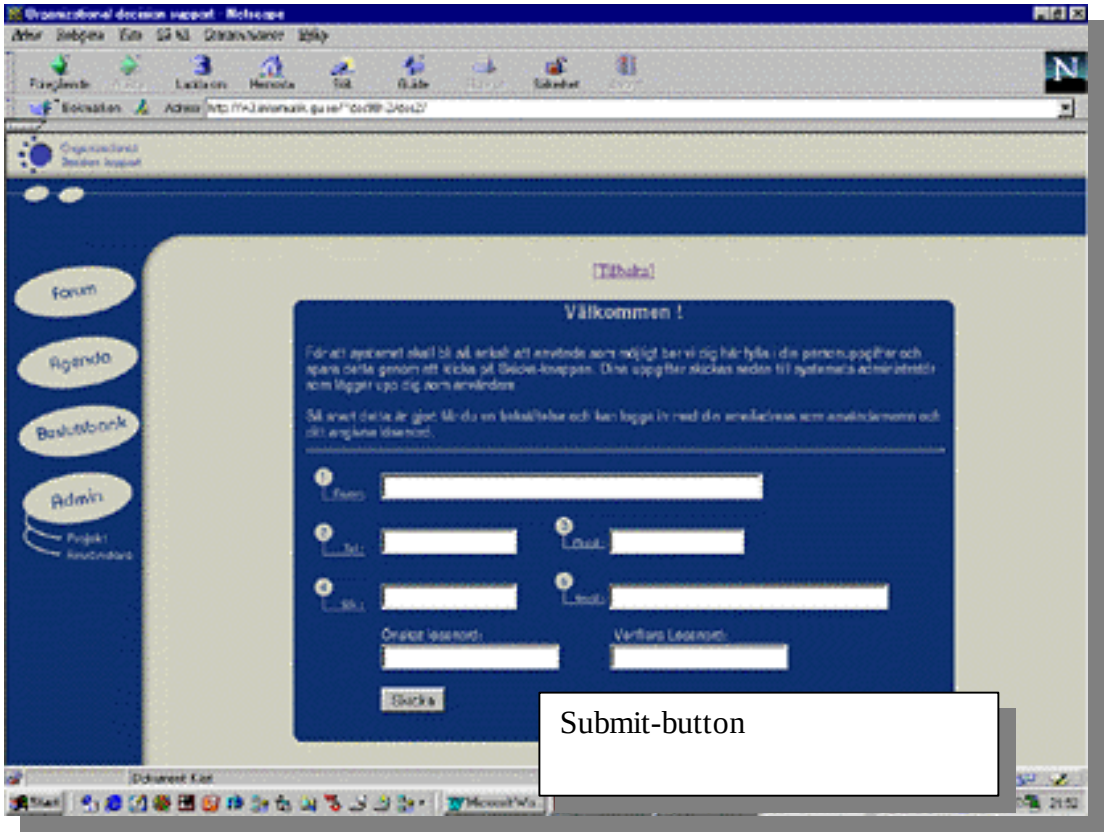


10.3.2 Submit the information

The information you specify in these fields will be sent to an administrator who will set up an account for you and will notify you when your account is activated.

Fill in the form with your preferences and choose a unique password. Send this by click on the submit button.

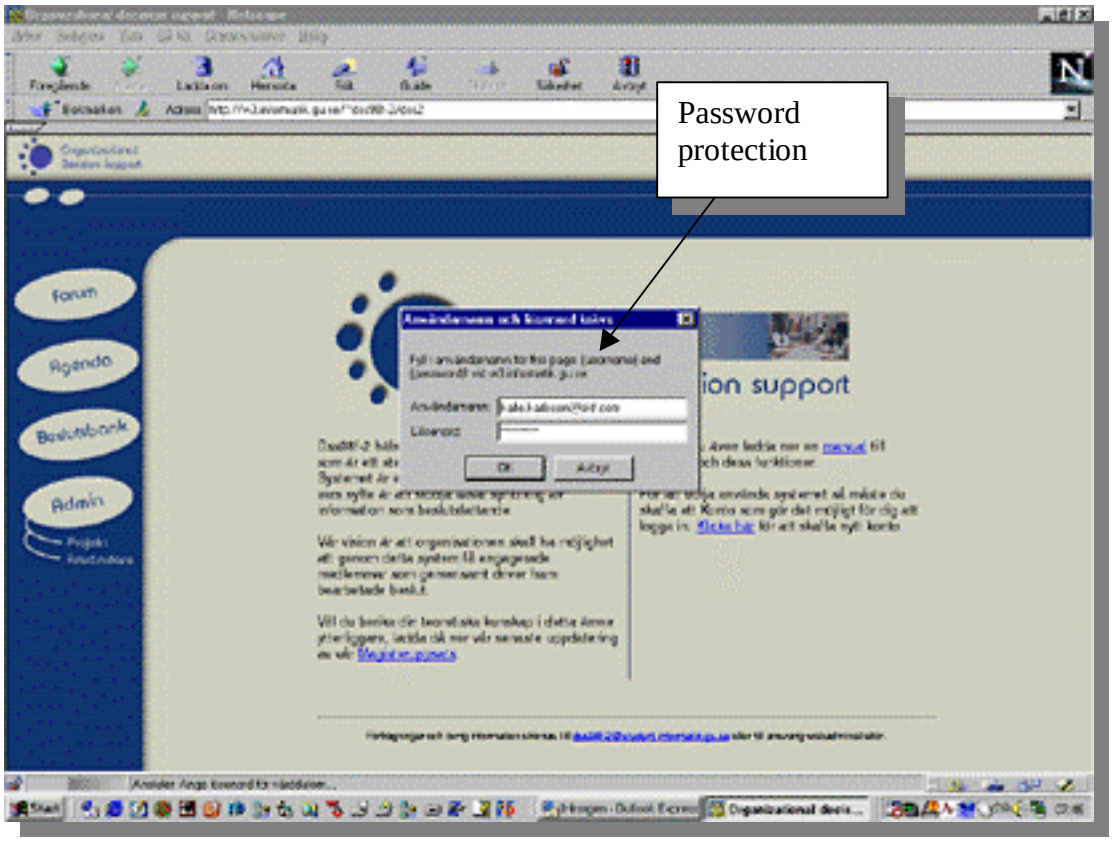
Note. The account request will be sent to an administrator who manually sets up an account for you. This procedure can take up to a day to administrate.



10.3.3 Log in with your account

This procedure is used to prevent unauthorized users to access the system and to declare your personal preferences to the system.

Fill in your email address in the username field and your unique password in the password field and click OK.

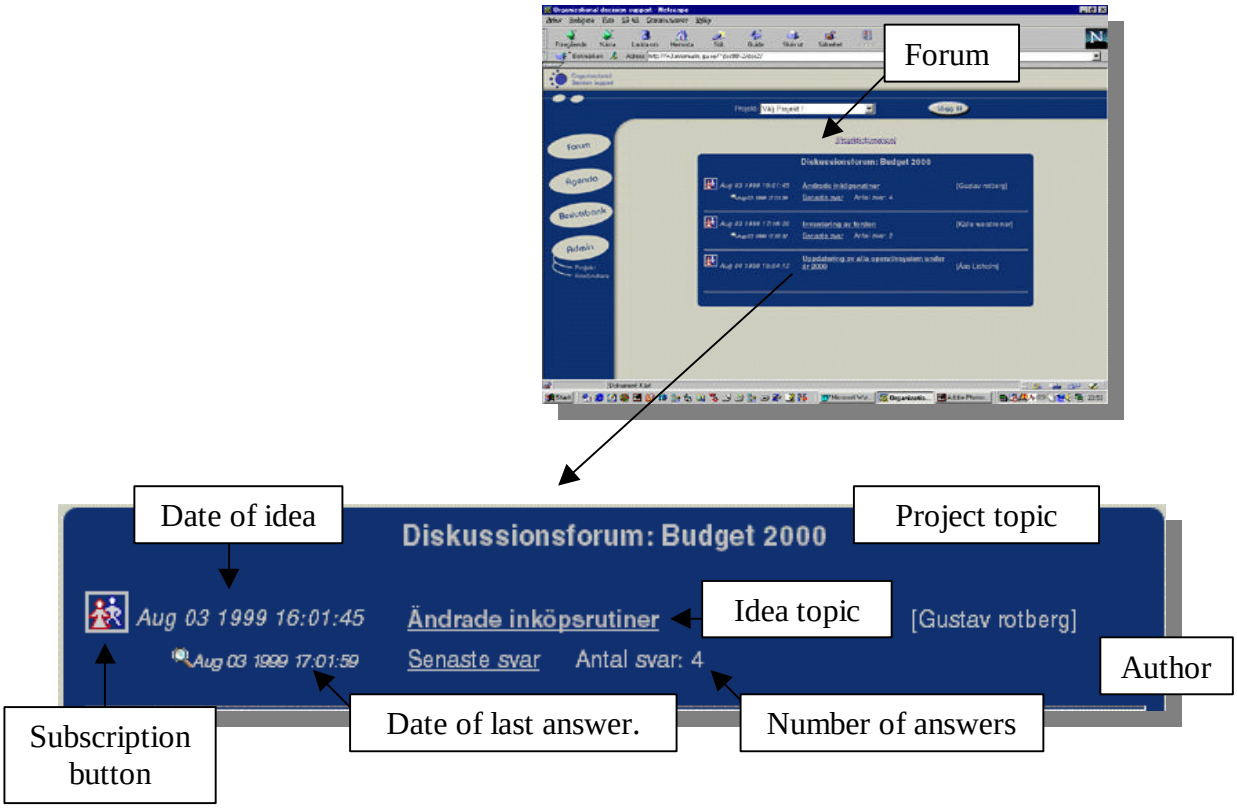


10.4 Forum

10.4.1 Main Features

The Forum is the function where a question/idea is discussed within the group over a period of time. This discussion will later lead to a decision.

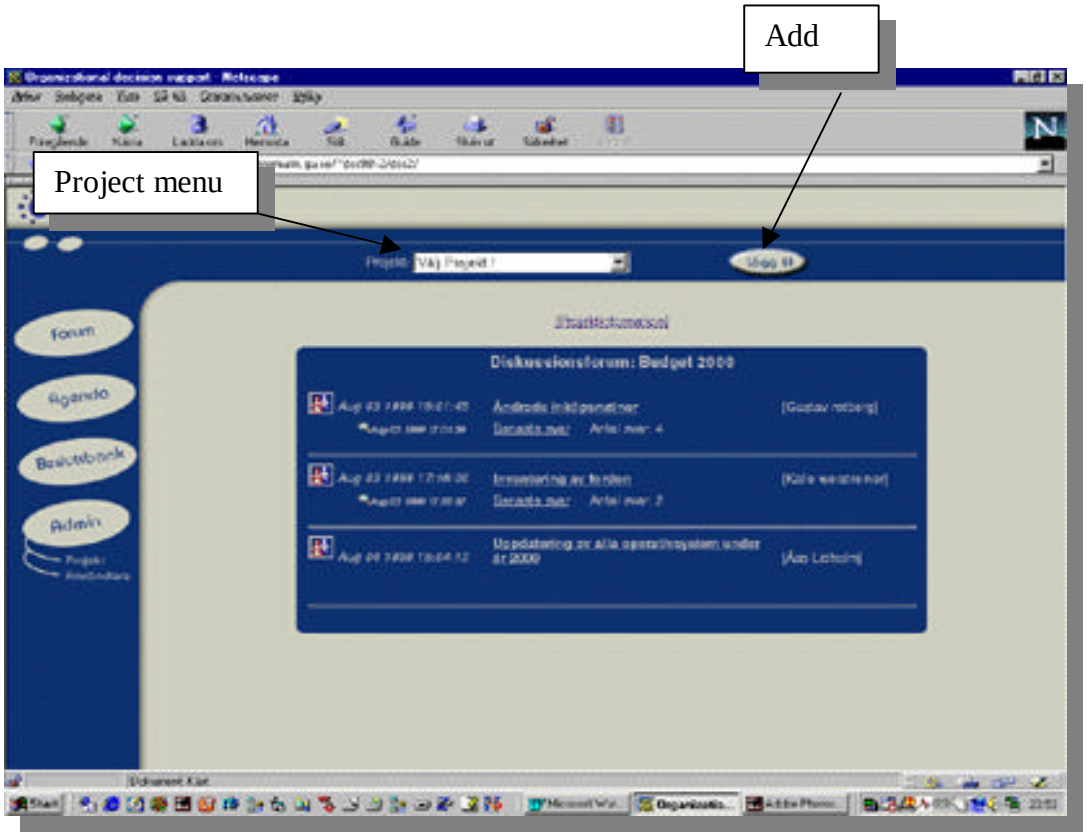
Click on Forum in the main menu to go to the forum area. On the next page is a description of the information shown by an already active question.



10.4.2 Create a new idea

This function raises a new question/idea, which will be discussed in the forum. The question/idea will after discussion lead to a decision.

Select project in the dropdown menu at the top, and then click the "Add" button on the function menu to create a new idea/question.

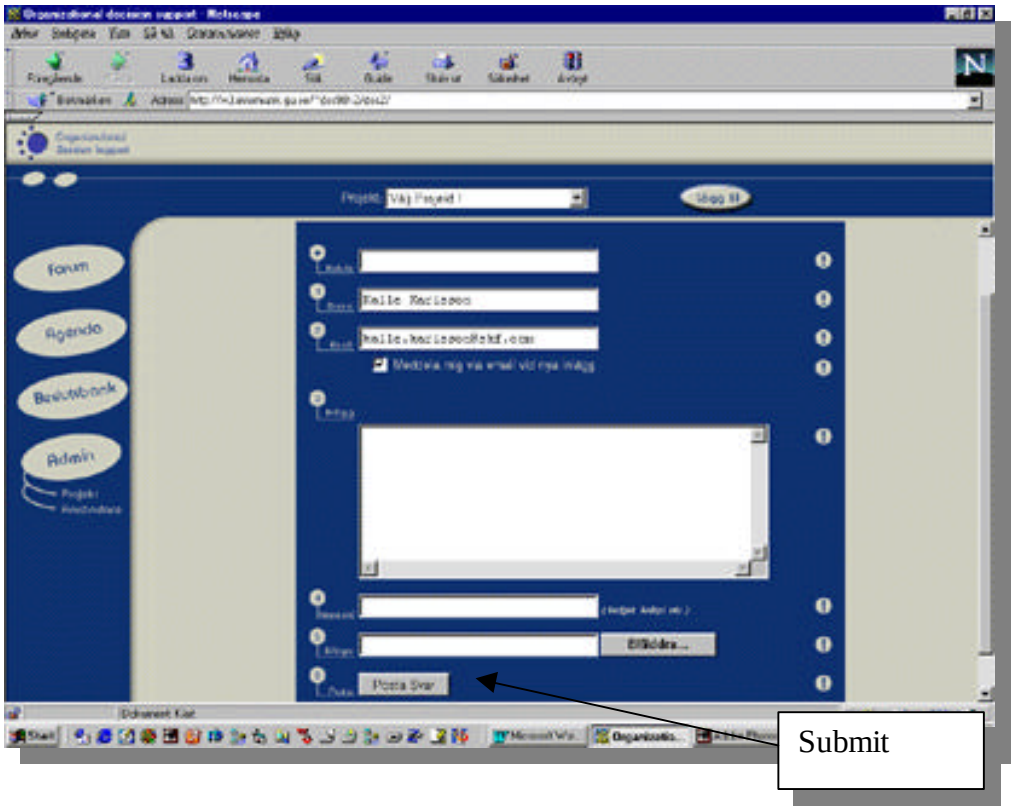


10.4.3 Submit the information

The information you specify in these fields will be saved and showed in the main forum window. The idea/question is now opened for discussion. As an author of an idea/question. You will be notified by email (if specified) when answers are made.

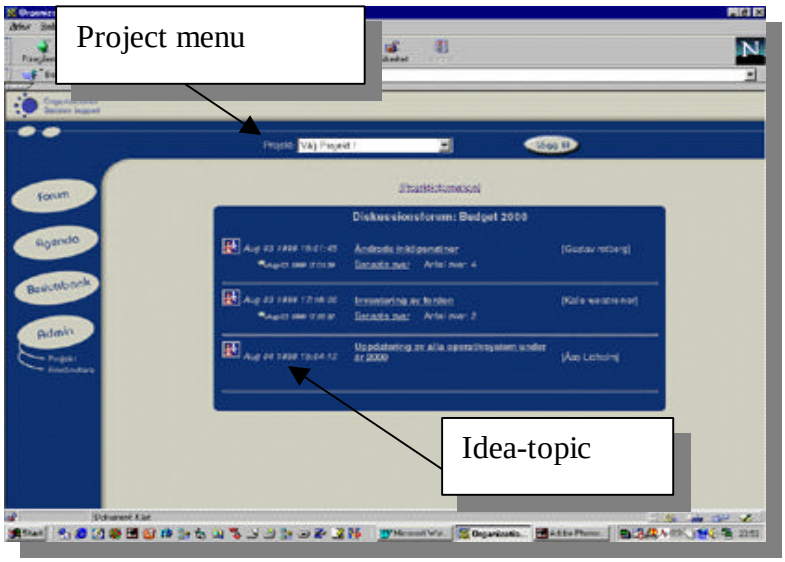
Fill in the form with the information related to the idea/question. Send it by clicking the submit button.

Note. Don't forget to add some keywords which should be related to the idea/question.



10.4.4 Read an idea/question

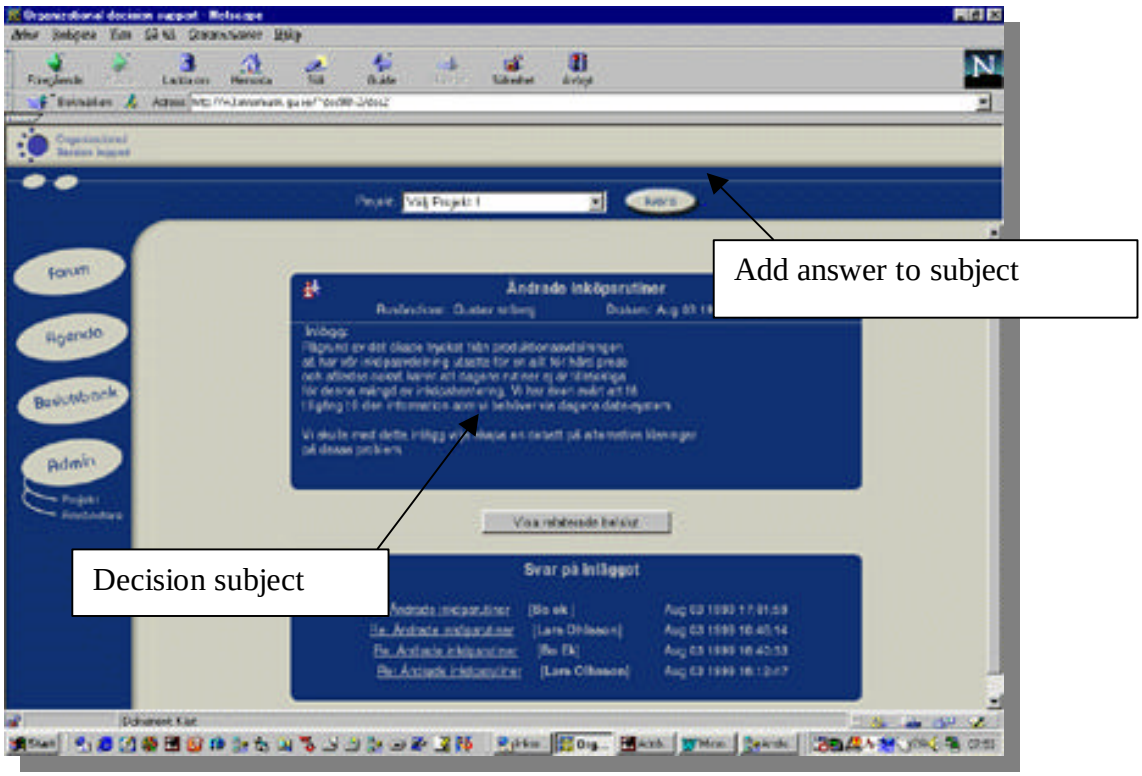
This picture displays a specific project with its ideas/questions aswell as their responses. Select project in the dropdown menu at the top, and then click the idea-topic of interest.



10.4.5 Respond to an idea/question

This feature makes a response to an idea/question. When the response is stored in the database, the system automatically sends a notification email to the author of the idea and to the subscribers of this idea.

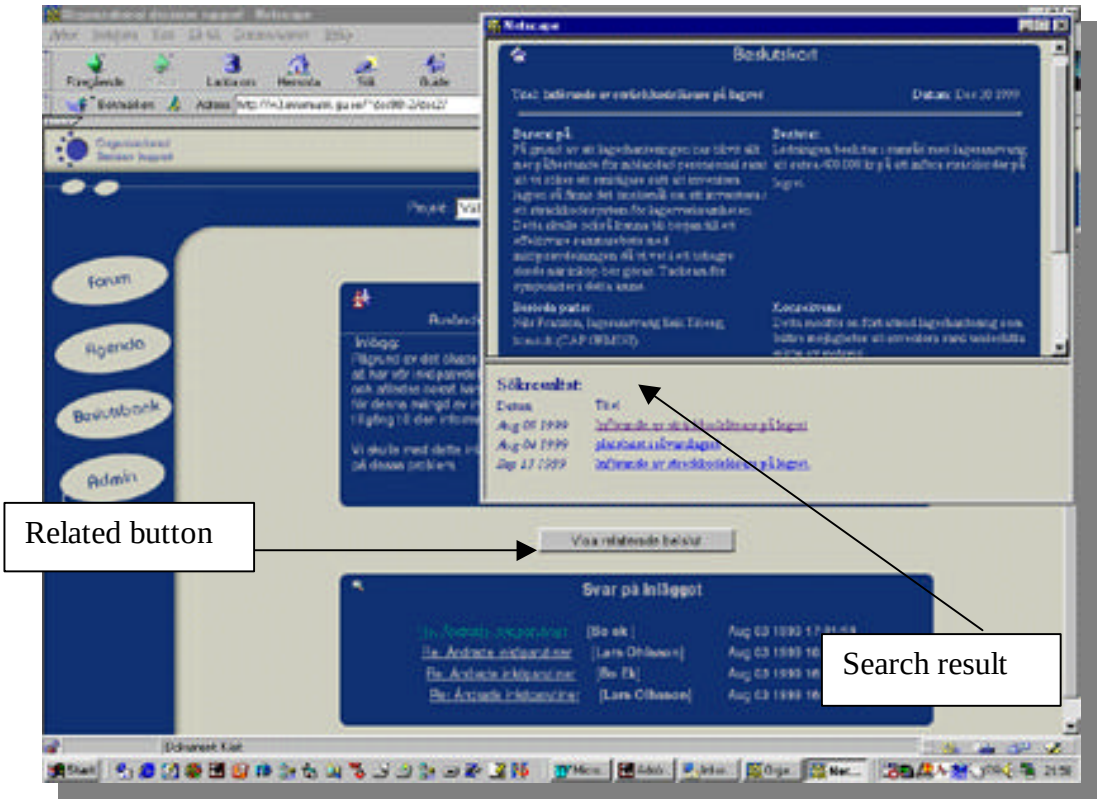
Click on the respond button in the function menu to add an answer.



10.4.6 Related decisions

It's possible to enrich the debate with information from previously made decisions by using this function. The system searches through the decision bank and selects decisions which have keywords related to the specific idea.

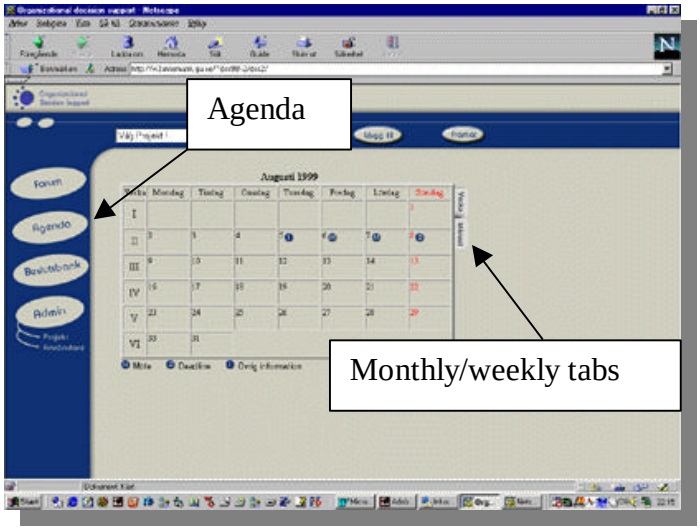
Click on the relate button in the middle of the screen. If a match is found, you may choose to examine it by clicking the link.



10.5.Agenda

10.5.1 Main Features

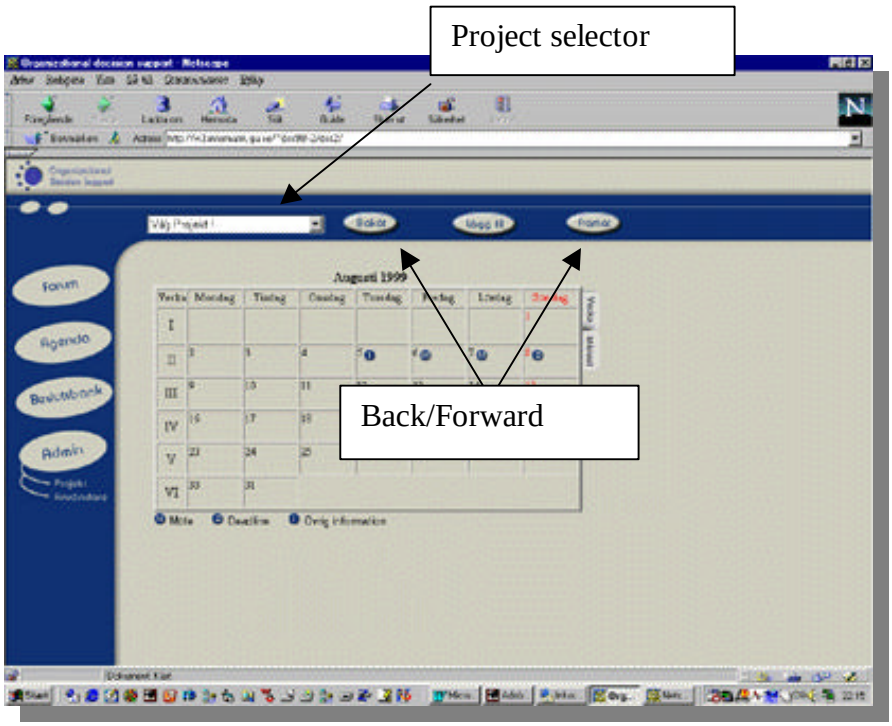
The Agenda is basically a filofax to organize appointments for each project. The agenda is also automaticly linked to all deadlines created in the forum and display a notification of this. Click on Agenda in the main menu to get to the Agenda area. To flip between a monthly or weekly view, use the tabs shown to the left.



10.5.2 Change project or date

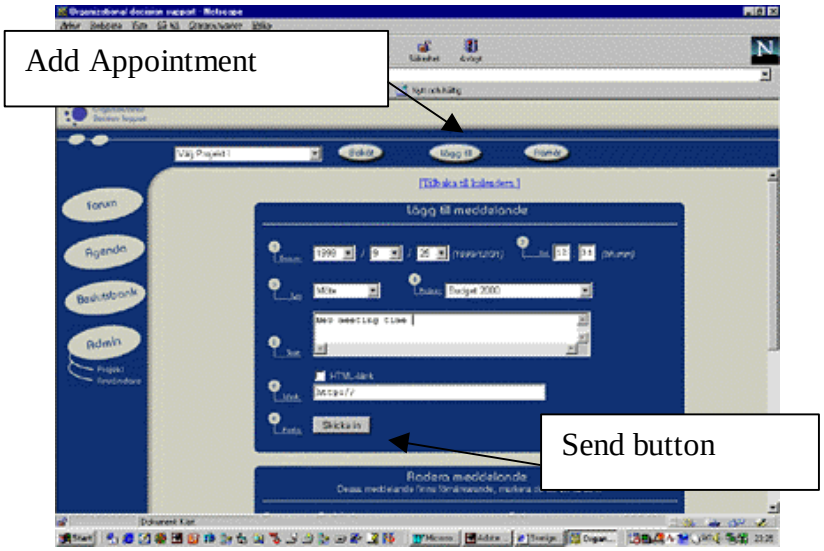
To view appointments of a specific project, click on the dropdown list in the function menu and choose a project.

To change the date-view just click on back or forward in the function menu.



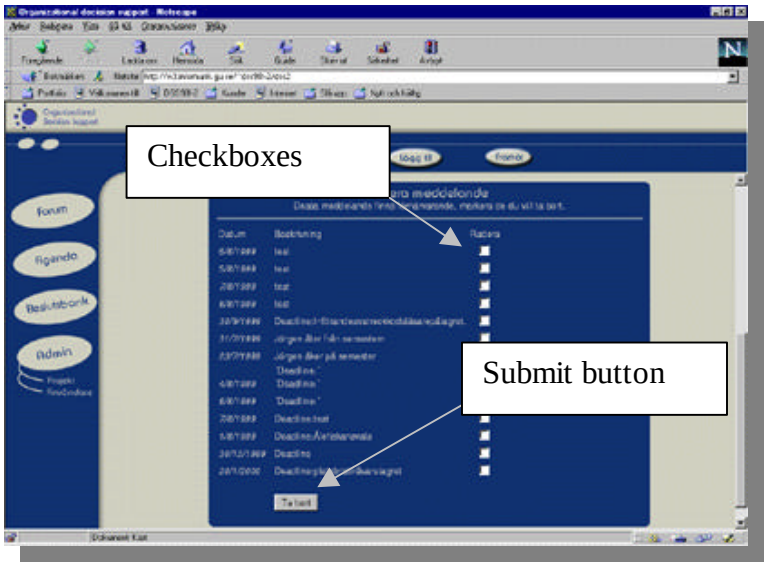
10.5.3 Add appointment

To add a new appointment, just click the Add button in the function menu. Fill in the information in the form and add it to the agenda by clicking on the send button



10.5.4 Remove appointments

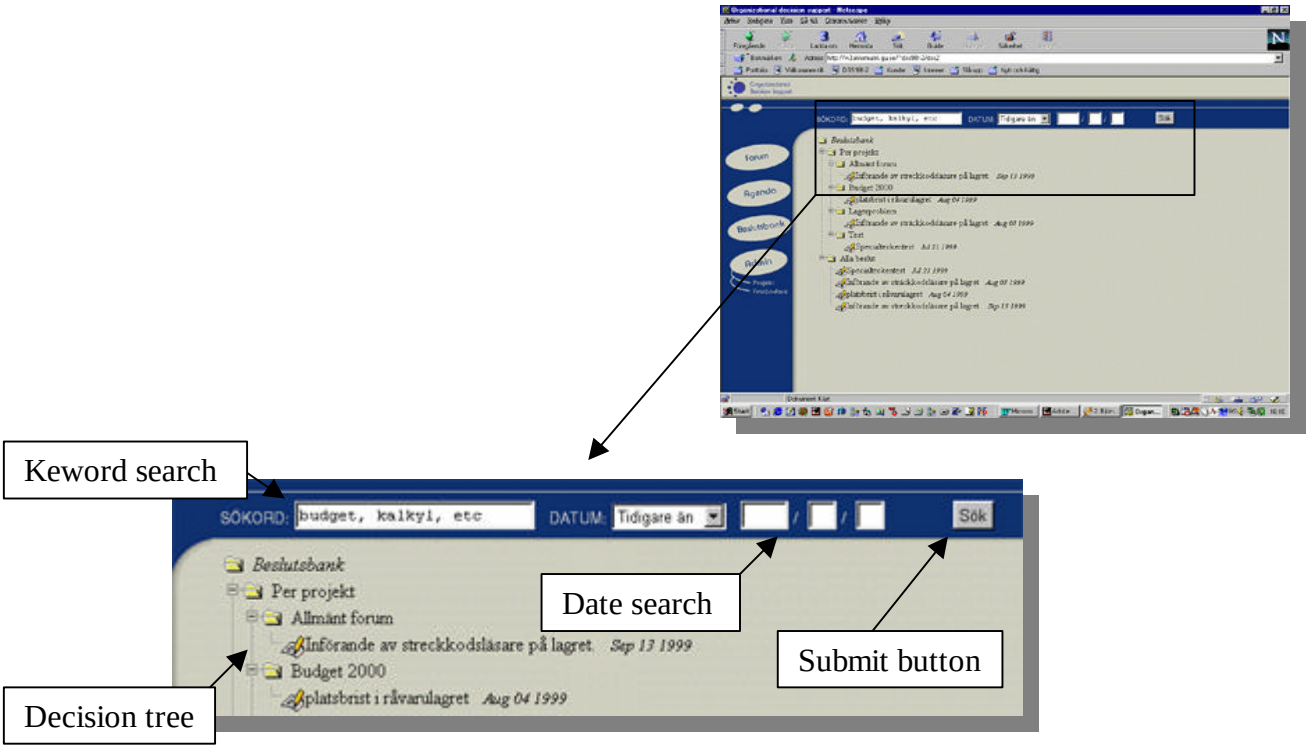
Click on the link "Remove/edit" to enter this area. Just check the checkbox by the appointment you want to remove and click the submit-button.



10.6 Decision bank

10.6.1 Main features

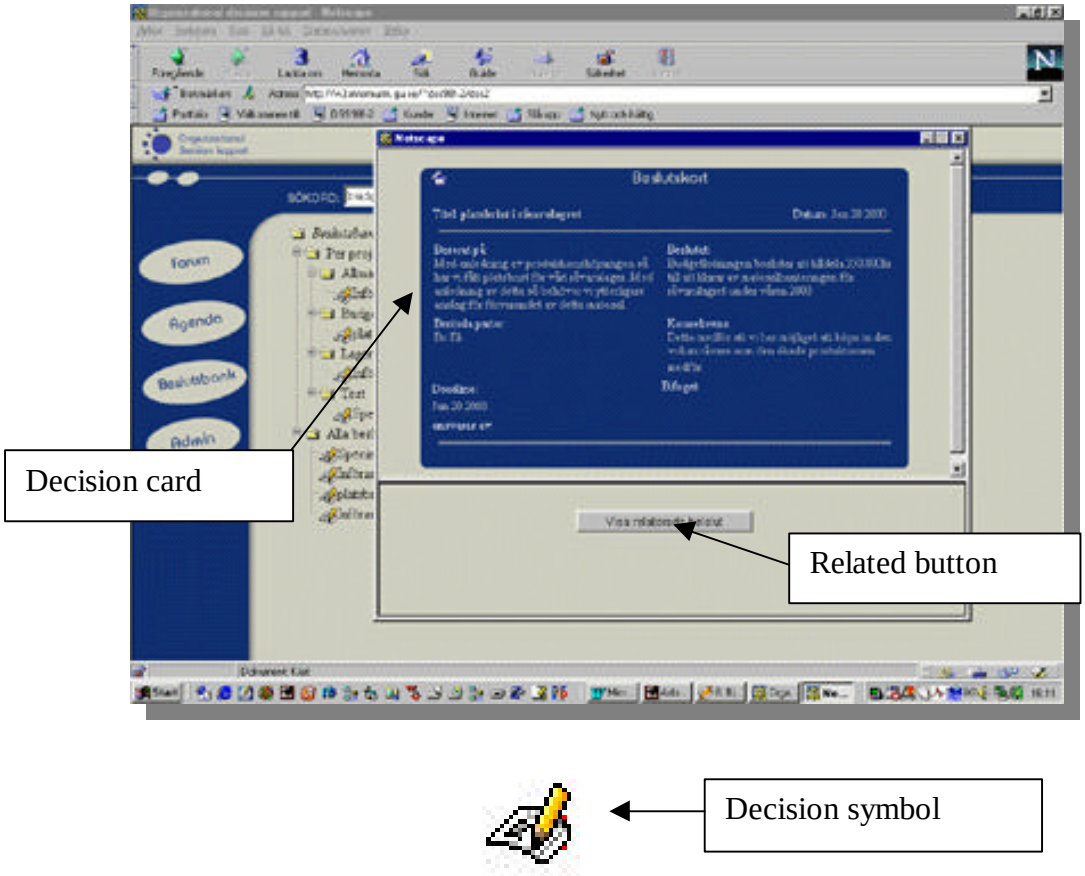
All decisions, which are developed in the system, are stored in this bank. This area enables you to search the bank in two ways, either by keyword related to a specific decision, or by date. Each decision can also be located in the decision tree, which is sorted by categories and projects.



10.6.2 Read a decision in the decision tree

There are several ways to locate and read a decision. One way to locate a specific decision is by using the decision tree, which is structured and divided into projects. To read a specificdecision located by the decision tree do as follows.

Click on the folder where the specific decision may be located. Click on the decision symbol to read the decision card. To see related decision, just click on the related button below the card.



10.6.3 Read a decision by search

A second way to read a decision is to locate it by using the search function. The search function can be used in two ways, by keywords or by date. The keyword search locates decision, which have the same keywords as the ones you enter. The date search can either be used to locate decisions created before or after the date submitted.

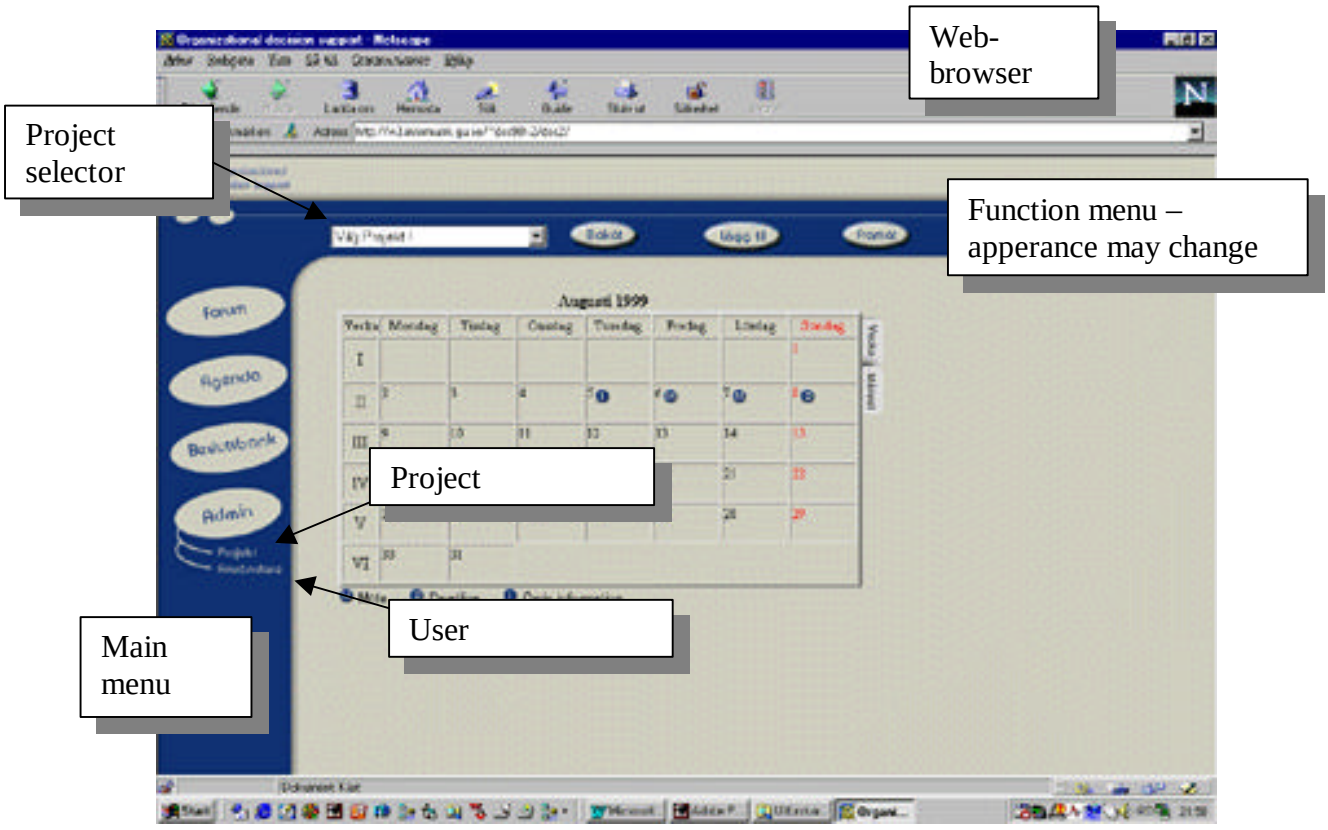
Enter the keywords you are interested in. If you choose to search by using more than one keyword, they must be divided by a comma. Submit the search by clicking the search button on the function menu. The result of your search will be displayed in a popup-window. To read a specific decision, just click on one of the search result.

10.7 Introduction to administration

This guide is divided into two sections, one for project administration and one for user administration. The main objective with this guide is to give the administrator a guide with illustrations to quickly learn and use the system. Further instructions or help directs to the authors.

10.8 Concepts

Below is a short declaration of some concepts, which will be used in the guide.



10.9 Prerequisite

The system itself can be used in any web browser with access to the Internet, but the browser must support cookies. This can usually can be adjusted in the options menu of the web browser. The browser must also be able to execute

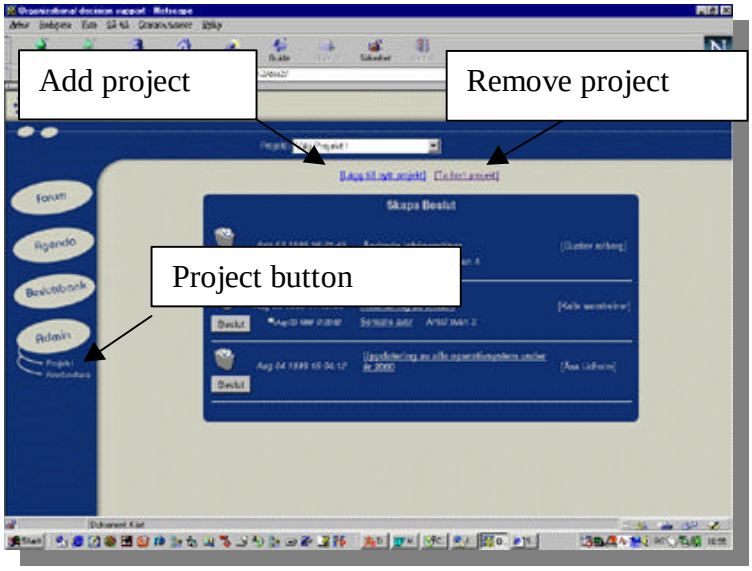
JavaScript, this is normally no problem if your you use a later version of either Netscape or Internet Explorer.

10.10 Project admin

10.10.1 Main Features

The project area is the area to add and edit projects within the system. This is also the area to create decisions from the forum.

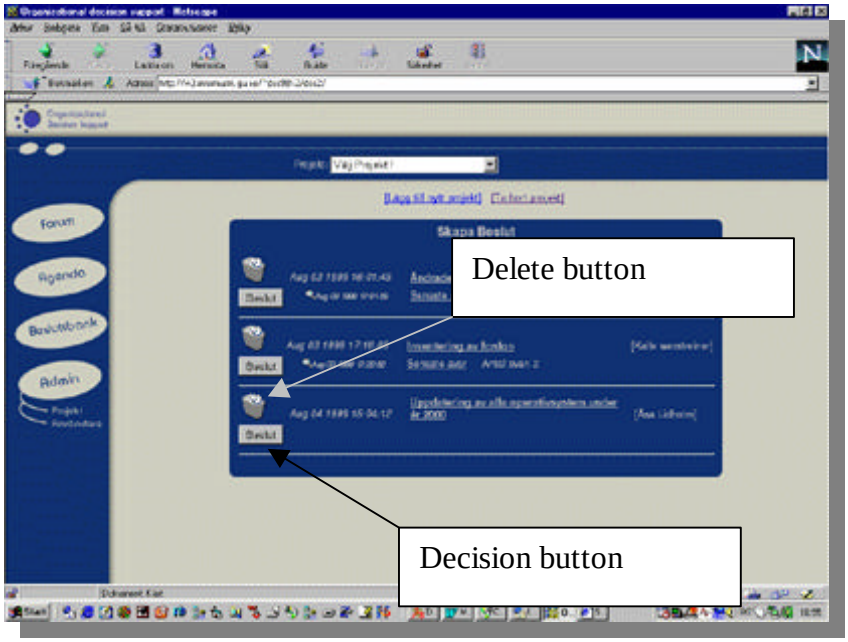
Click on Projects under Admin in the main menu to go to the project area.



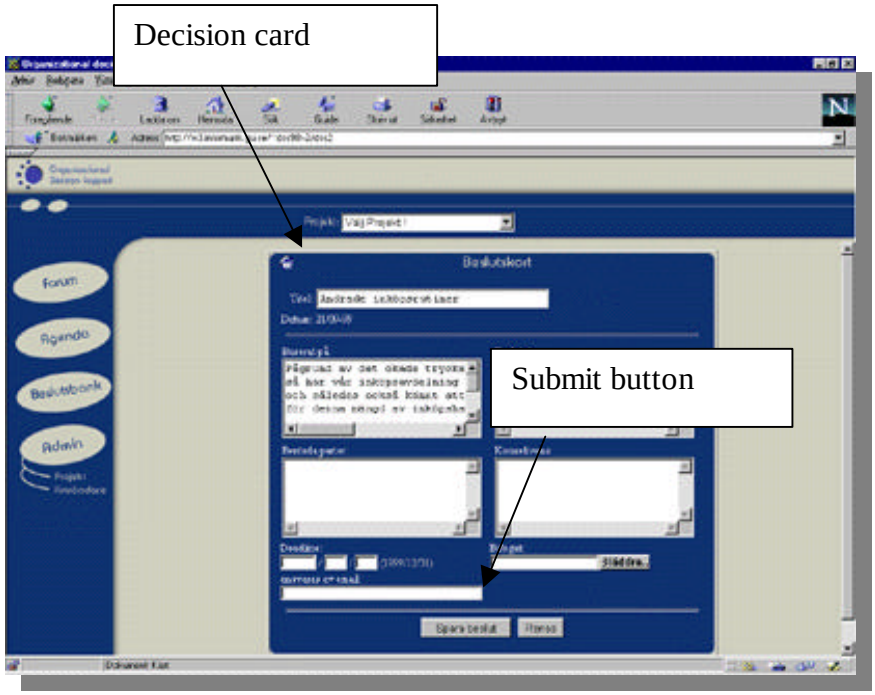
10.10.2 Create a decision

The project area will show a list of all ideas discussed within the forum. You can either choose to create a decision from one of the ideas or delete the idea without creating any decision.

To create a decision, just click the "decision button" next to the specific idea. To delete an idea without making a decision, just click the trashcan. (Changes are permanent, there is no undo.)



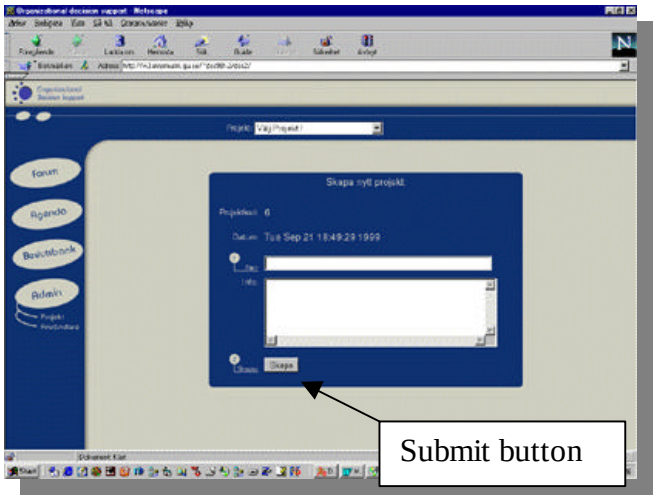
The creation of a decision is made with a decision card, which will appear on the main screen. The decision card includes information related to the specific idea. The input form enables you to add and edit the information within the card. Enter or edit the specific information about the decision and store the decision card by clicking the submit button.



10.10.3 Add a project

A project contains several ideas, which will be discussed in the forum, and later stored as decisions.

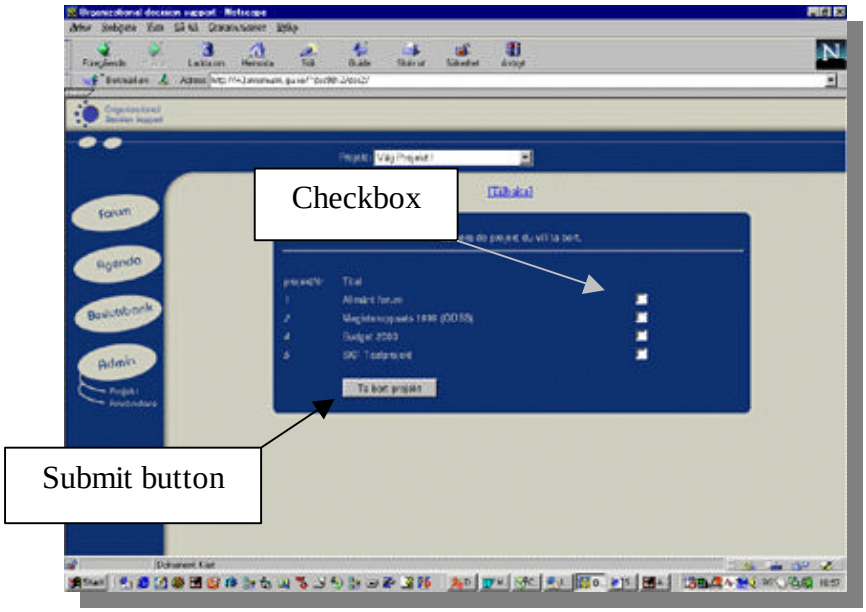
To create a new project just fill in the information in the form and click on the submit button. The project title will now appear in the project dropdown menu in the other parts of the system.



10.10.4 Delete a project

A deletion of a project will delete all active ideas and appointments related to the specific project.

Check the checkbox next to the project you want to remove and click on submit

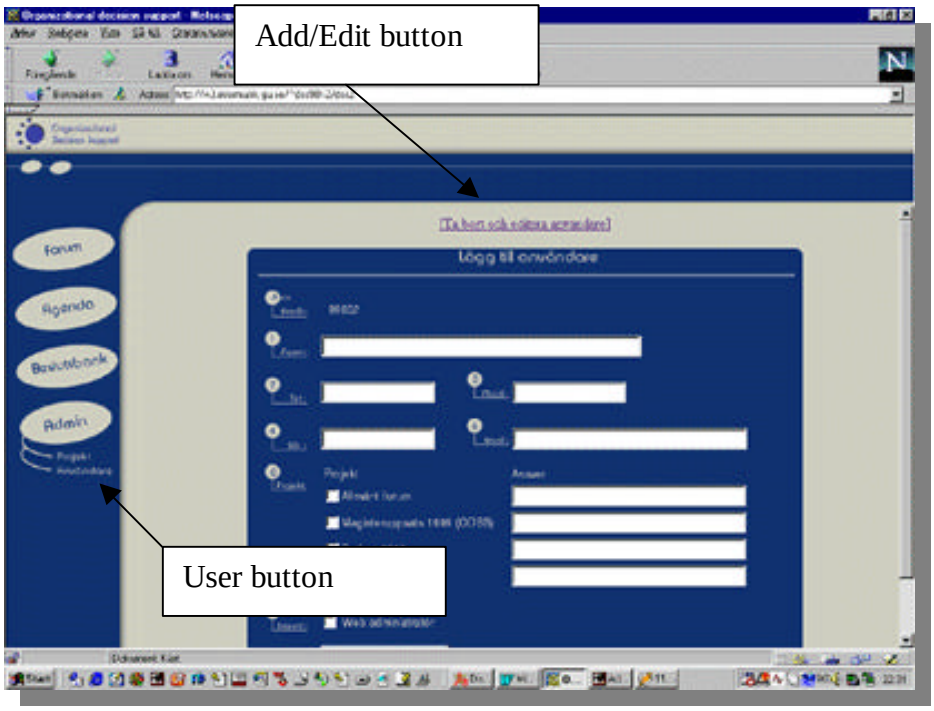


10.11 User admin

10.11.1 Main Features

The User area is the area where you add and edit users registerd to the system.

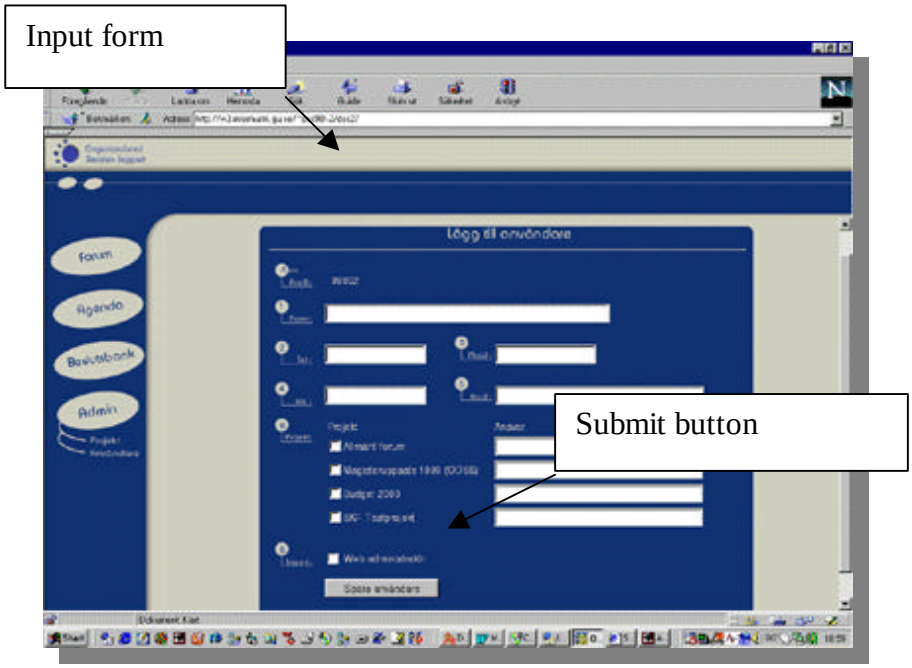
Click on Users under Admin in the main menu to go to the user area.



10.11.2 Add a user

A user can only be registerd once in the system, but he/she can be involved in several projects. There is also a possibility to make a user responsible for a specific task within a project, but he/she doesn't need to have any responsibility to take part in a discussion.

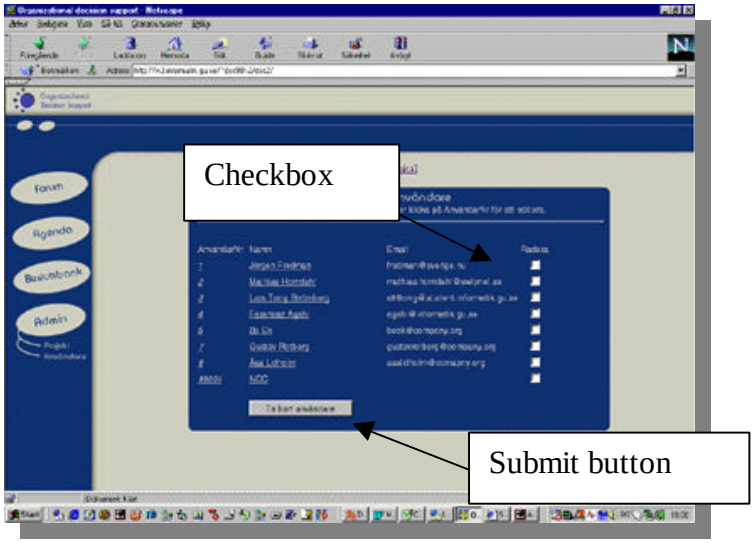
To create a new user just fill in the information in the form and click on the submit button.



10.11.3 Delete a user

A user doesn't have to be deleted when his/hers involvement in a project is over. He/she can still have their personal id stored in the system for later use. But if a user due to some reason need to be removed, do as follows:

Check the checkbox next to the user you want to remove. Then click on the on the submit button at the bottom of the screen.

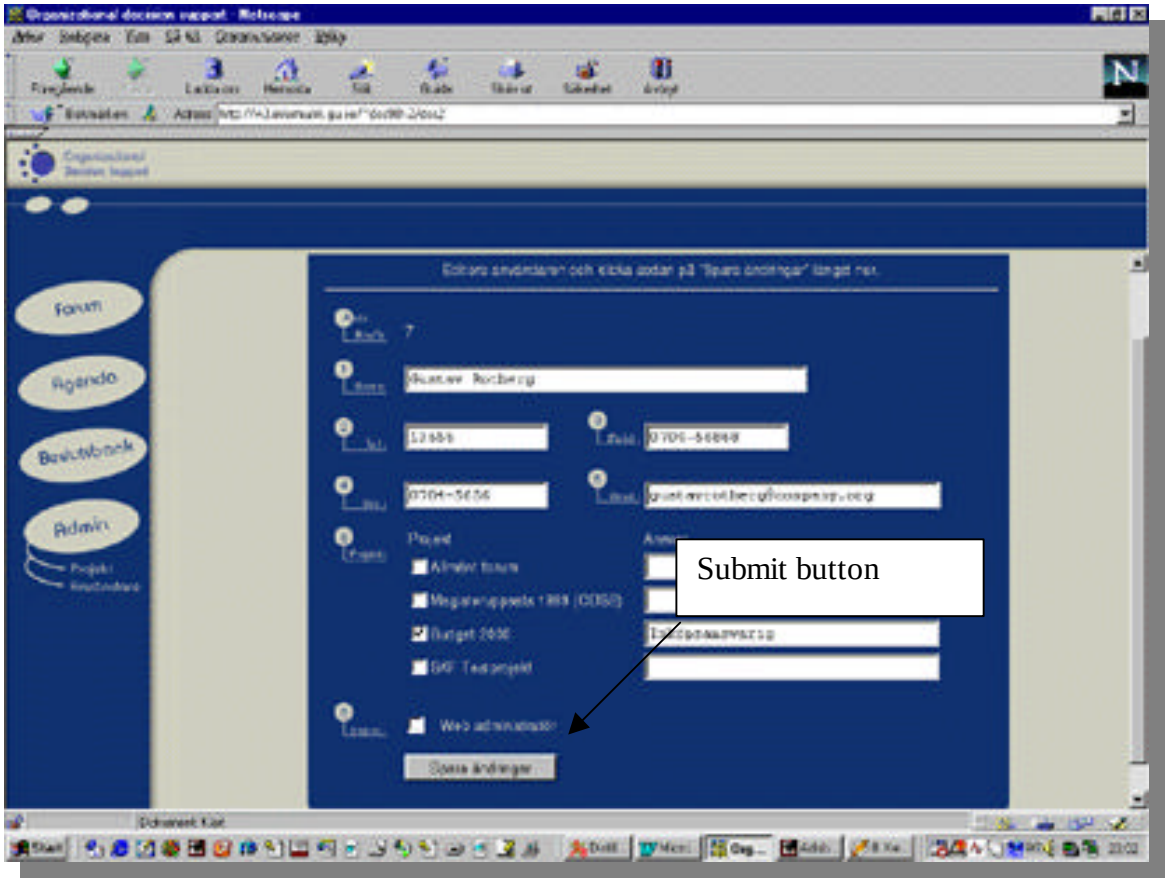


10.11.4 Edit a user

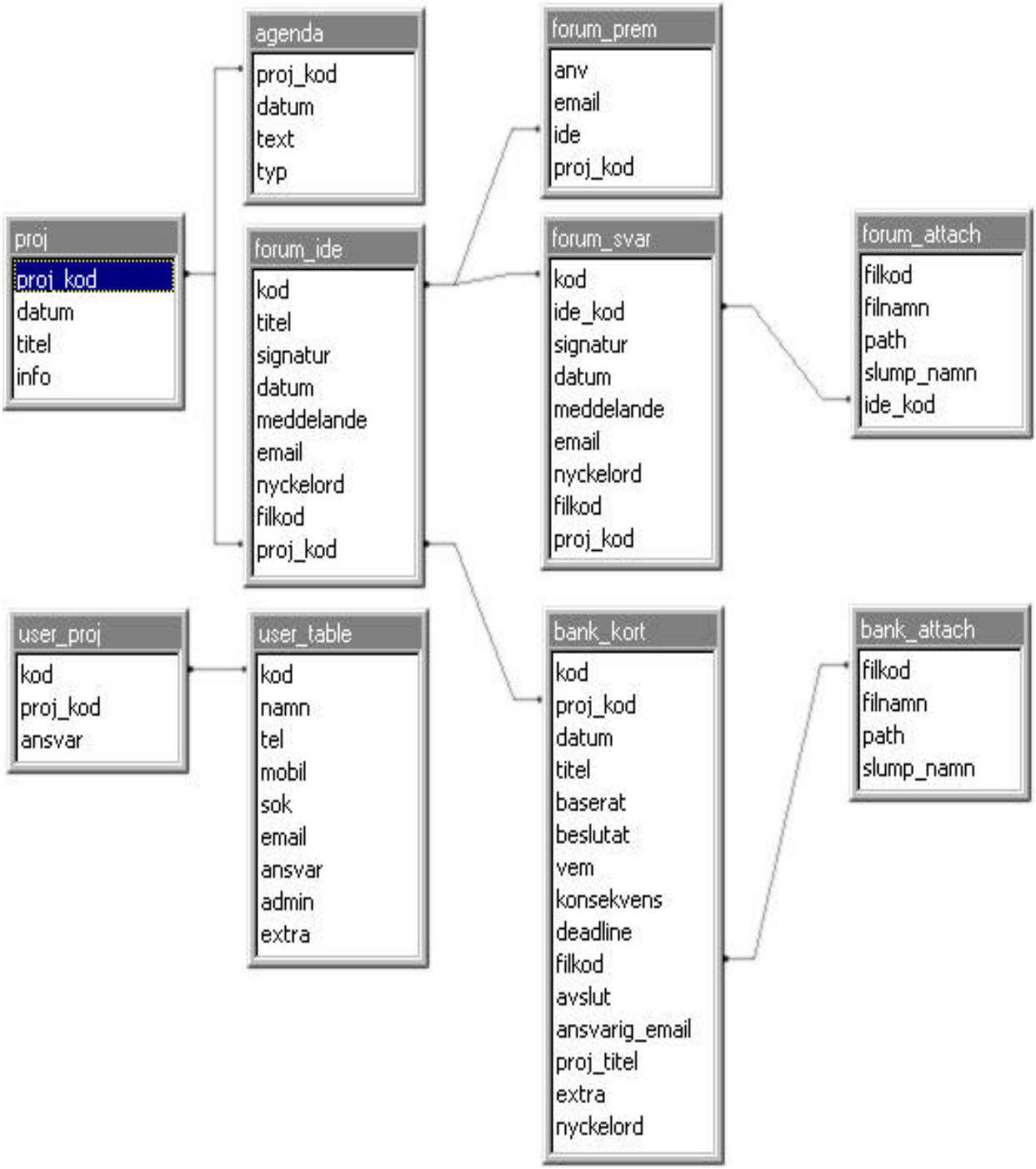
If a user changes his/hers personal id such as email, phone number etc, you have to use this function.

Click on the Add/edit button on top of the main window and click on the user who you want to edit (see picture above).

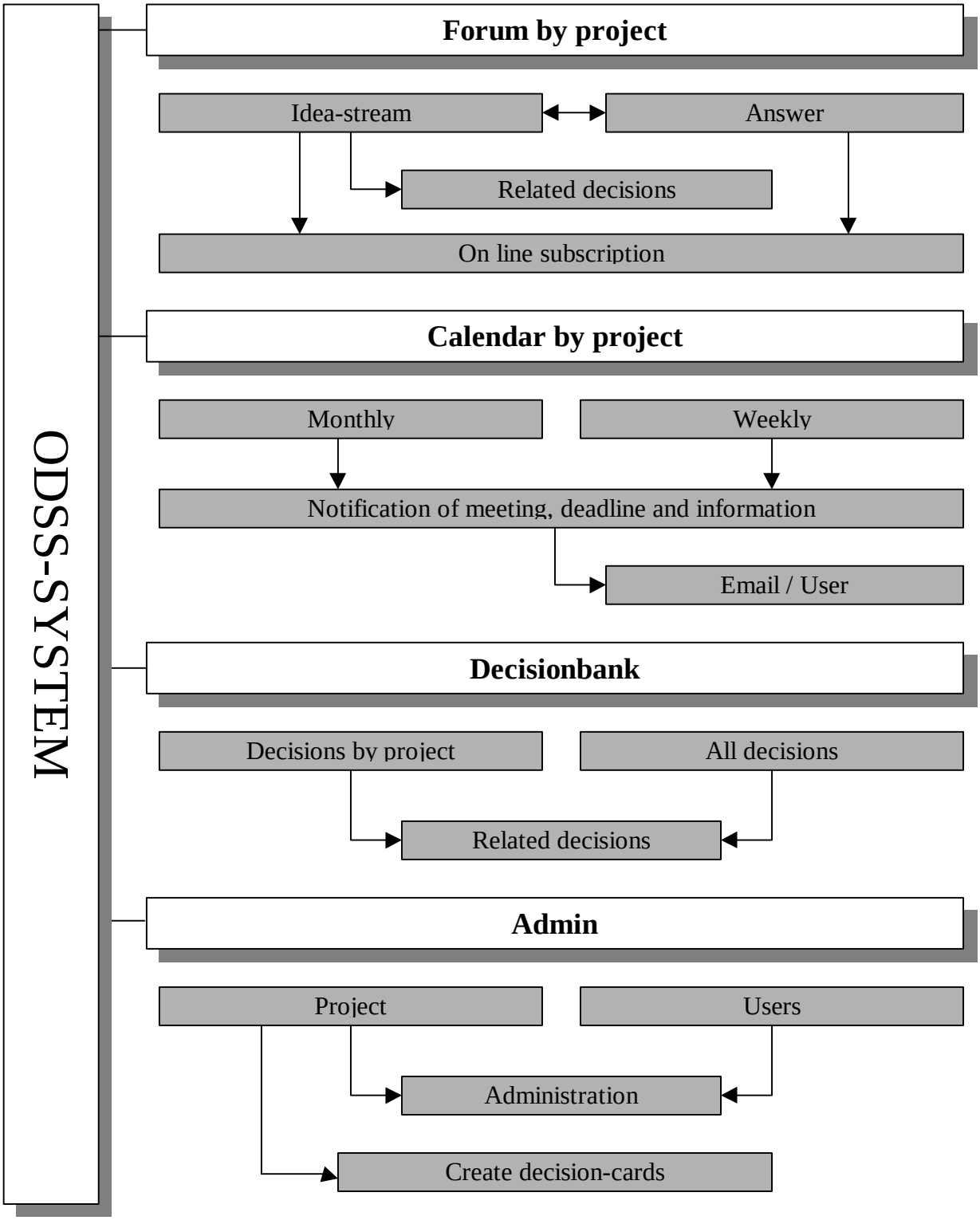
Edit the information in the field according to the changes and store the information by clicking on the submit button.



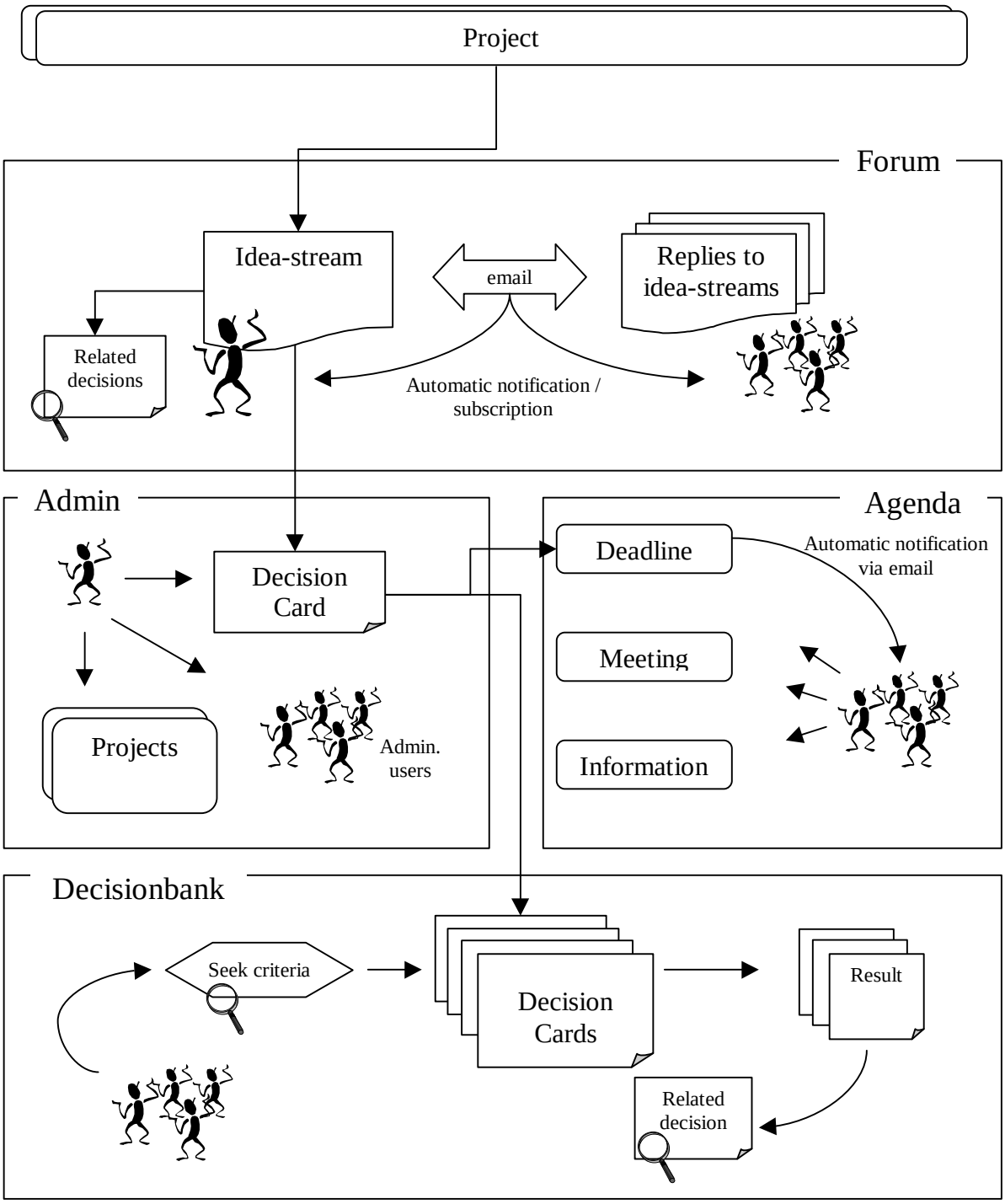
Structure of database design , developed in PostgreSQL.



System Design



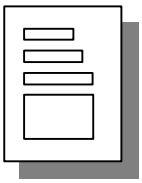
ODSS SYSTEM


Project
Forum
Idea-stream
email
Replies to idea-streams
Related decisions
Automatic notification / subscription
Admin
Agenda
Decision Card
Deadline
Automatic notification via email
Meeting
Projects
Admin. users
Information
Decisionbank
Seek criteria
Decision Cards
Result
Related decision

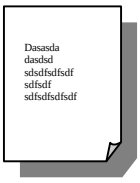
Script declaration

This declaration contains a complete information of all CGI-scripts used by the system. The declaration is divided into the subsystems and is organized alphabetically by the name of the script. Each subsystem begins with a graphical script map to enhance the understanding of each script and its relations. Below is a description of the symbols that are used in each script map.

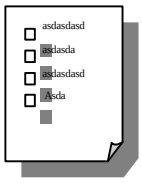
Input form



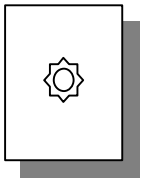
Html output (lists, reports)



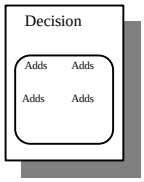
Input form Subscription



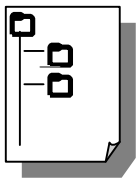
Storage script



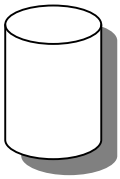
Decision card



Decision tree

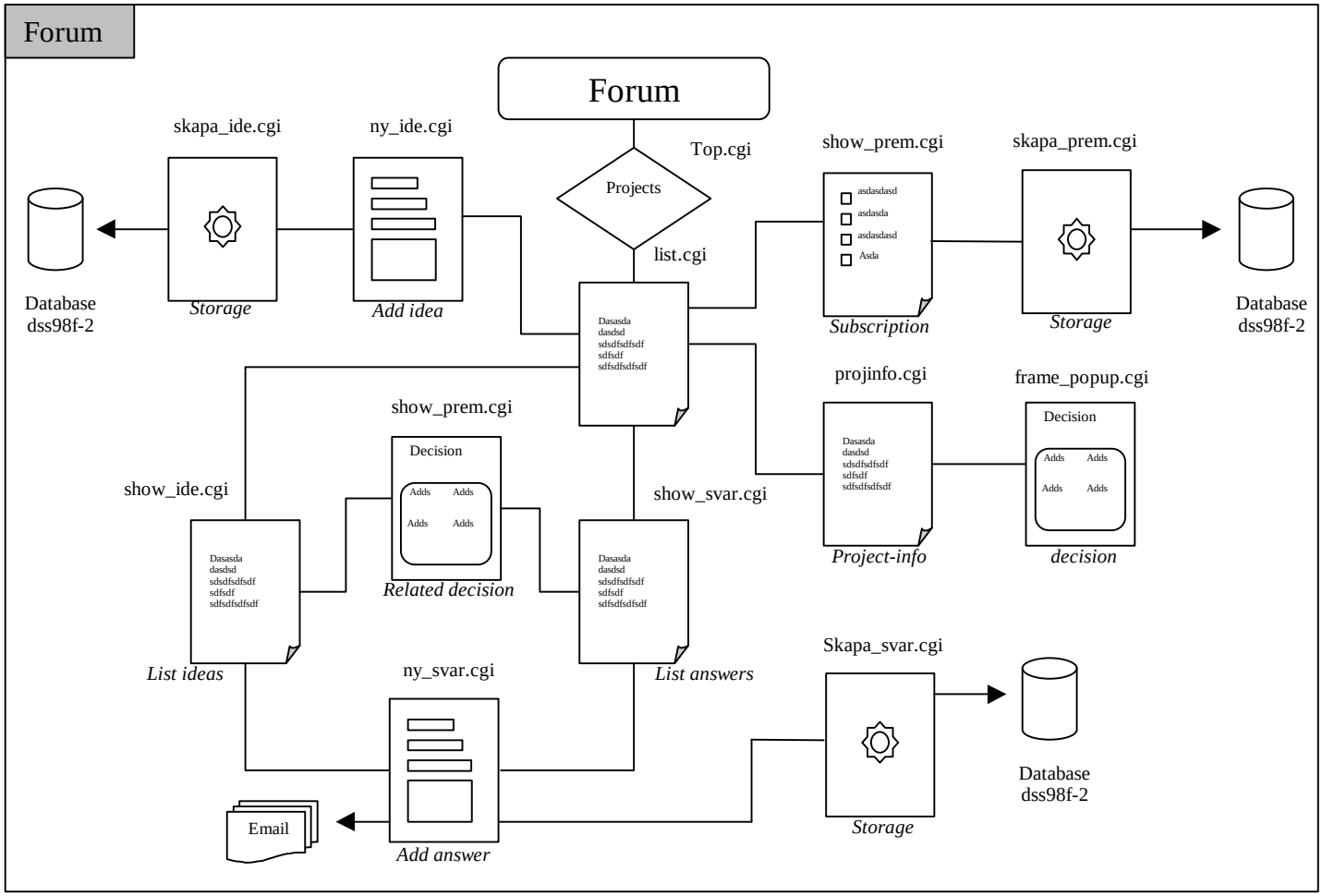


Database



Forum

The purpose of the forum subsystem is first and foremost pure communication between the decision makers in an environment which is intended to be structured, intuitive and safe. Structured and intuitive, due to the possibilities of dividing different decision subjects into threaded discussion subjects. Here our intention was to divide the different decision streams in the organization into well defined corresponding streams also in the forum subsystem, i.e. each decision problem in reality would be corresponded by a threaded decision subject in the forum.



```
#!/usr/bin/perl

##############################################################################
# Program:    list.cgi
# Date:       9/8-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Prints out a list of all ideas within the specific project and how
#             many answers there have been to this idea.
#
# CGI-variables:
#             num (hänvisar till projektnummer)
#
##############################################################################

#****************** Filnamn ***
$prem_prg = "show_prem.cgi";    #*** pre_program, ligger i javascript
$info_prg = "projinfo.cgi";     #*** projinfo.cgi visar info om projektet

#****************** Initiera subrutiner och variabler ***
use DBI;
sub fixa_datum;
sub tolka_formular;
sub felkontroll;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh1 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$color = "#ffffff";

#****************** Huvudprogram ***
tolka_formular;
$prem_prg = "$prem_prg"."?num=$form{num}";    #variabel för pre_program, ligger
                                              # i javascript
$info_prg = "$info_prg"."?num=$form{num}";    #variabel för projinfo.cgi som
                                              # visar info om projektet
print "Content-Type: text/html\nPragma: no-cache\n\n";

#************** Hämtar projekttiteln ********************
$proj_query = "select titel from proj where proj_kod=$form{\"num\"}";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
@proj = $sth->fetchrow_array;

#***** Felkontroller (om projektet inte existerar) ***
if ($form{'num'} eq "" || $proj[0] eq "")   {felkontroll "projekt";}

#***** Skriv ut toppen av html-sidan ***
print <<_TOP_;
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html><head>
<title>Organizational decision support</title>
<! ett script för att få upp ett pop-upfönster för att välja vilka
prenumeration man vill göra >

<script language="javascript">
function prem(){
```

```
window.open('$prem_prg','window2','scrollbars=yes,resizable=yes,outerWidth=644,
outerHeight=462')
}
<!--
function PopUp(Anchor){
 url = '$prem_prg';
  popUpWin = window.open(url,'PopUp','width=644,height=462');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
      }
// -->

</script>
</head>
<body background=bilder/bkgrnd2.gif>
<br><center>
<font face=helvetica size=2 color=silver><a href="$info_prg" >
[Projektinformation]</a></font></center>

</body>
<body background=bilder/bkgrnd2.gif alink=teal link=silver vlink=teal><br>
<table border=0  cellspacing=0 cellpadding=0 align=center valign=TOP
background=bilder/bkgrnd22.gif nowrap>
       <tr>
       <td>
       <table border=0 align=left cellspacing=0 cellpadding=0  valign=top
       width=585 background=bilder/bkgrnd22.gif>
       <tr>
       <td width=12 height=25 align=left valign=top ><img src=bilder/corner1.gif
       width=12 height=11 hspace=0 vspace=0 border=0 align=left alt=></td>
       <td width=100% align=center valign=bottom >
       <font face=helvetica size=3 color=silver><b>Diskussionsforum:
       $proj[0]</b></font></td>
       <td width=12 align=right valign=top ><img src=bilder/corner2.gif width=11
       height=12 hspace=0 vspace=0 border=0 align=right  alt=></td>
       </tr>
       <tr>
       <td width=12 align=left valign=bottom  ></td>
       <td width=100% align=left valign=bottom > </td>
       <td width=12 align=right valign=bottom  height=20> </td>
       </tr>
       <tr>
_TOP_

#************ Hämtar en ide ***
$ide_query = "select * from forum_ide where proj_kod=$form{\"num\"}";
$sth = $dbh->prepare($ide_query);
$rader = $sth->execute;
#************

for ($i = 0; $i < $rader; $i++)  #*** Loopa över alla ideer ***
{
@ide = $sth->fetchrow_array;
$ide_num = $ide[0]; $ide_titel = $ide[1]; $ide_signatur = $ide[2];
fixa_datum $ide[3]; $ide_datum = $datum; #*** Gör ett läsbart datum

#************ Räknar antalet svar till ideen ***
$antal_svar_query = "select count(*) from forum_svar where ide_kod = $ide[0]";
```

```
$sth2 = $dbh2->prepare($antal_svar_query);
$rader2 = $sth2->execute;
@antal_svr = $sth2->fetchrow_array;
#************
$antal_svar = $antal_svr[0];

#************ Hämtar senaste svar till denna ide ***
$svar_query = "select * from forum_svar where ide_kod = $ide[0] order by kod
desc";
$sth2 = $dbh2->prepare($svar_query);
$rader2 = $sth2->execute;
@svar = $sth2->fetchrow_array;
#************
$svar_num = $svar[0];
fixa_datum $svar[3]; $svar_datum = $datum; #*** Gör ett läsbart datum

#*** Skifta färg på raderna i tabellen ***
if ($color eq "#ffffff"){$color = "#E8EAE9";}else {$color = "#ffffff";}



#***** Skriv ut body'n av html-sidan ***
print <<_STOP_;
       <!--      NY STROEM    -->
       <tr>
       <td  width=12 align=left valign=bottom  height=20> </td>
       <td width=100% align=left valign=top >
       <table border=0 valign=top align=left cellspacing=0 cellpadding=0
       valign=top background=bilder/bkgrnd22.gif>
       <tr >
        <td valign=top ><A href="javascript:PopUp()" ><IMG alt="Klicka här för
       att prenumerera på inlägget" src=bilder/people.gif border=2></td>
       <td valign=bottom > <font face=helvetica size=2
       color=silver><i>$ide_datum</i></font></td>
       <td > </td>
       <td  valign=bottom  nowrap width=270 ><font face=helvetica size=2
       color=silver><b><A
       href=\"../script/frame.cgi?funktion=forum_disk&sida=show_ide.cgi?num%3D$i
       de_num&ide=$ide_num\"  target=\"right\">
       $ide_titel</b></font></A></td>
       <td nowrap align=right  valign=bottom ><font face=helvetica size=2
       color=silver>  [$ide_signatur]</font></td>
       </tr>
_STOP_

#*** Finns det svar skriv denna del
if($antal_svar>0)
{
print <<_STOP_;
       <tr >
       <td height=30 valign=bottom > </td>
       <td align=center nowrap width=150 ><img src=bilder/closeup.gif width=11
       height=11 alt= border=0><font face=helvetica color=silver
       size=1><i>$svar_datum</i></font></td>
       <td valign=middle > </td>
       <td colspan=2 valign=middle ><font face=helvetica size=2 face=helvetica
       color=silver><A
```

```
      href="../script/frame.cgi?funktion=forum_disk&sida=show_svar.cgi?num%3D$s
      var_num&ide=$ide_num" target=\"right\">
      Senaste svar</A>     Antal svar:
      $antal_svar</font></td>
      </tr>
      </table>

      </td>
      <td width=12 align=right valign=bottom  height=20> </td>
      <tr>
      </tr>
      <tr>
      <td width=12 align=left valign=bottom  ></td>
      <td width=100% align=left valign=bottom ><hr></td>
      <td width=12 align=right valign=bottom  height=20> </td>
      </tr>
      <!--     SLUT STROEM    -->
_STOP_
}

#*** Finns det inga svar skrivs denna del
else
{
print <<_STOP_;
      <tr>
      <td height=30 valign=bottom > </td>
      <td align=center nowrap width=150 > </td>
      <td valign=middle > </td>
      <td colspan=2 valign=middle > </td>
      </tr>
      </table>
      </td>
      <td width=12 align=right valign=bottom  height=20> </td>
      <tr>
      </tr>
      <tr>
      <td width=12 align=left valign=bottom  ></td>
      <td width=100% align=left valign=bottom ><hr></td>
      <td width=12 align=right valign=bottom  height=20> </td>
      </tr>
      <!--     SLUT STROEM    -->
_STOP_
}
}

#***** Skriv ut slutet av html-sidan ***
print <<_STOP_;
      <tr>
      <td width=12 align=left valign=bottom ><img src=bilder/corner3.gif
      width=12 height=11 hspace=0 vspace=0 border=0 align=left alt=></td>
      <td width=100% align=left valign=bottom > </td>
      <td width=12 align=right valign=bottom ><img src=bilder/corner4.gif
      width=11 height=12 hspace=0 vspace=0 border=0 align=right alt=></td>
      </tr>
      </table>
      </td>
      </tr>
      </table>
</form>
```

```
</body>
</html>
_STOP_

#****** Stäng databaskopplingarna ***
$dbh -> disconnect;
$dbh1 -> disconnect;
$dbh2 -> disconnect;


#****************** Subrutiner ***
#****************** Sub fixa_datum ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5  $4";
  return $datum;
}

#****************** Sub tolka_formular ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}

#****************** Sub felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    list_beslutskort.cgi
# Date:       9/8-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Collects the information from the  bank_kort table based on the
#             request and print this into a decision-card.
#
# CGI-variables:
#             num (hänvisar till koden för ett beslutskort)
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
sub fixa_datum;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;
print "Content-Type: text/html\nPragma: no-cache\n\n";

#***** Skriv ut toppen av html-sidan ***
print <<_TOP_;
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Organizational decision support</title>
</head>
<body background="bilder/bkgrnd2.gif" alink=silver link=silver vlink=silver
><br>
<table width="223" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr><td>
      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  background="bilder/bkgrnd2.gif">
      <tr>
      <td width="12" height="20" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/icocard.gif" width=16
      height=16 hspace=0 vspace=2 border=0 align="left" alt=""><img
      src="bilder/txtbeslutskort.gif" width=95 height=21 hspace=0 vspace=0
      border=0 align="middle" alt=""><br><br>
      </td>
      <td width="12" align="right" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>  <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
```

```
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
_TOP_

#************** hämtar sökresultat från korttabelen ********************
$kort_query = "select * from bank_kort where kod = $form{num}";
$sth = $dbh->prepare($kort_query);
$rader = $sth->execute;
#************
@kort = $sth->fetchrow_array;
$datum  = fixa_datum $kort[2]; #*** Skapa ett läsbart datum
$kort[8]= fixa_datum $kort[8]; #*** Även för deadline
$blink = "";
if ($kort[13] eq 'true' ){$blink = "<blink>";}else{$blink = "";}
#************** hämtar attachment från bank_attach ********************
$attach_query = "select * from bank_attach where filkod = $kort[9]";
$sth = $dbh->prepare($attach_query);
$r = $sth->execute;
#************
for ($i = 0; $i < $rader; $i++)
{@attach = $sth->fetchrow_array;}
#***** Skriv ut body'n av html-sidan ***
print <<_MAIN_;
      <!-- Beslutskort header start. variabler: titel, ID, datum  -->
      <table border="0" nowrap align="left" cellspacing="0" cellpadding="2"
      valign="top" background="bilder/bkgrnd2.gif">
      <tr>
      <td width="42" height="15" align="Right" valign="bottom"
      background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
      color="white">Titel:</font></td>
      <td nowrap width="350" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
      color="Silver"><b>$kort[3]</b></font></td>
      <td width="100%" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
      color="white">Datum:</font></td>
      <td  nowrap width="70" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
      color="Silver">$datum</font></td>
      </tr>
      </table>
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <hr width="495"  align="Center">
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      </tr>
      <!-- Beslutskort header slut -->
      <!-- Beslutskort huvud start. variabler: Baseratpa, beslutat,
      berordaparter, konsekvens, deadline, attachment -->
      <tr>
```

```
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<table border="0" nowrap align="left" cellspacing="0" cellpadding="3"
valign="top" background="bilder/bkgrnd2.gif">
<tr>
<td nowrap width="250" height="65" align="left" valign="top"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Baserat på:<br></font>
<font face="times new roman" size="2" color="Silver">$kort[4]</font>
</td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
color="white">Beslutat:<br></font>
<font face="times new roman" size="2" color="Silver">$kort[5]</font>
</td>
</tr>
<tr>
<td nowrap width="250" height="65" align="left" valign="top"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Berörda parter:<br></font>
<font face="times new roman" size="2" color="Silver">$kort[6]</font>
</td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
color="white">Konsekvens:<br></font>
<font face="times new roman" size="2" color="Silver">$kort[7]</font>
</td>
</tr>
</table>
<!-- Beslutskort huvud slut -->
</td>
<td width="12" align="right" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<!-- Beslutskort attachmnet. Variabler: Deadline, attachment -->
<table border="0" nowrap align="left" cellspacing="0" cellpadding="1"
valign="top" background="bilder/bkgrnd2.gif">
<tr>
<td nowrap width="250" height="5" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Deadline:</font>
<font face="times new roman" size="2"
color="Silver"><br>$blink$kort[8]</font>
</td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
color="white">Bifogat:</font></td>
<!-- nytt attachment -->
</tr>
<tr>
```

```
      <td nowrap width="250" height="5" align="left" valign="top"
      background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
      color="white">ansvaras av:</font>
      <font face="times new roman" size="2"
      color="Silver"><br>$kort[11]</font></td>
      <td nowrap width="250" align="left" valign="top"
      background="bilder/bkgrnd22.gif"> 
      <font face="times new roman" size="2" color="Silver"><a href=
      $attach[2]/$attach[3]>$attach[1]</a></font>
      </td>
      </tr>
      </table>
      <!-- Beslutskort attachmnet slut -->
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <hr width="495"  align="Center">
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      </table>
</td>
</tr>
</table><br></body></html>
_MAIN_

#*** Avsluta databaskopplingen ****
$dbh -> disconnect;

#****************** Subrutiner ***
#****************** Sub tolka_formular ***
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
```

```
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
#****************** Sub felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}

#****************** Sub fixa_datum ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5";
  return $datum;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    list_sokresultat.cgi
# Date:       9/8-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Prints out a list of the search-result based on the given
#             keywords.
#
# CGI-variables:
#             ide (hänvisar till koden för en ide)
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
sub fixa_datum;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;

#**** Hämtar nyckelord från projekttabell ***
$kort_query = "select nyckelord from forum_ide where kod = $form{ide}";
$sth = $dbh->prepare($kort_query);
$rad = $sth->execute;
@nyckelord = $sth->fetchrow_array;
$nyckelord = $nyckelord[0];
print "Content-Type: text/html\nPragma: no-cache\n\n";

#***** Skriv ut toppen av html-sidan ***
print <<_TOP_;

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Organizational decision support</title>
</head>
<body background="bilder/bkgrnd2.gif">
<font face="times new roman" size="4" color="navy">Sökresultat:<br></font>
<!--font face="times new roman" size="2" color="navy"><i>nyckelord:
$nyckelord</i></font>
<br-->
<table border=0 cellpadding=0 cellspacing=0 width=400>
       <tr>
       <td valign=bottom ><font face="times new roman" size="2"
       color="navy">Datum</FONT></td>
       <td valign=bottom><font face="times new roman" size="2"
       color="navy">Titel</FONT></A>
       <td valign=bottom><font face="times new roman" size="2"
       color="navy"></font></td>
       </tr>
_TOP_
```

```
#******* Select-modul för nyckelord ***
$nyckelord_titel      = "$nyckelord";
$nyckelord_beslutat   = "$nyckelord";
$nyckelord_baserat    = "$nyckelord";
$nyckelord_konsekvens = "$nyckelord";

#****** Skapar sträng för field "titel" ****
@nyckelord_titel = split ", ", $nyckelord_titel;
$i=0;
foreach $ord (@nyckelord_titel)
{
$ord =~ s/ //g;
$ord = " '$ord'";

  if ($i<1){
    $ord =~ s/ / titel ~* /ig;
  }
  else
  {
    $ord =~ s/ / or titel ~* /ig;
  }
$i++;
}

#**** Skapar sträng för field "beslutat" *******
@nyckelord_beslutat = split ", ", $nyckelord_beslutat;
$i=0;
foreach $ord (@nyckelord_beslutat)
{
$ord =~ s/ //g;
$ord = " '$ord'";

  if($i<1)
  {
    $ord =~ s/ / beslutat ~* /ig;
  }
  else
  {
    $ord =~ s/ / or beslutat ~* /ig;
  }
$i++;
}

#**** Skapar sträng för field "baseratpa"  *******
@nyckelord_baserat = split ", ", $nyckelord_baserat;
$i=0;
foreach $ord (@nyckelord_baserat)
{
$ord =~ s/ //g;
$ord = " '$ord'";

  if($i< 1)
  {
    $ord =~ s/ / baserat ~* /ig;
  }
  else
  {
```

```
    $ord =~ s/ / or baserat ~* /ig;
  }
$i++;
}

#*******skapar sträng för field "konsekvens"*************
@nyckelord_konsekvens = split ", ", $nyckelord_konsekvens;
$i=0;
foreach $ord (@nyckelord_konsekvens)
{
$ord =~ s/ //g;
$ord = " '$ord'";

  if($i<1)
  {
    $ord =~ s/ / konsekvens ~* /ig;
  }
  else
  {
    $ord =~ s/ / or konsekvens ~* /ig;
  }
$i++;
}

#**** hämtar sökresultat från korttabelen *******
$kort_query = "select * from bank_kort where @nyckelord_beslutat or
@nyckelord_titel or @nyckelord_baserat or @nyckelord_konsekvens";
$sth = $dbh2->prepare($kort_query);
$rader = $sth->execute;
#************
#print"$kort_query";
for ($i = 0; $i < $rader; $i++)
{
@kort = $sth->fetchrow_array;
$datum = fixa_datum $kort[2];

print <<_MAIN_;
       <!-- Ny link -->
       <tr>
       <td valign=bottom><font face="times new roman" size="2"
       color="navy"><font face="times new roman" size="2"
       color="navy"><i>$datum</i></FONT></td>
       <td valign=bottom><font face="times new roman" size="2" color="navy"><a
       href="list_beslutskort.cgi?num=$kort[0]" target="top">
       $kort[3]</FONT></FONT></A>
       <td valign=bottom><font face="times new roman" size="2"
       color="navy">$blink$datum2</font></td>
       </tr>
_MAIN_
}


print <<_BOTTOM_;
</table>
</body>
</html>
_BOTTOM_

#*** Stäng databaskopplingar ***
```

```
$dbh -> disconnect;
$dbh2 -> disconnect;

#****************** Subrutiner ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq  'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}
#****************** Sub felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}

#****************** Sub fixa_datum ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5";
  return $datum;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    ny_ide.cgi
# Date:       16/6-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Prints out an input-form in order to create a new idea.
#
# CGI-variables:
#             num (projektkod)
#
##############################################################################

#****************** Filnamn ***
$ide_prg = "skapa_ide.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$email = $ENV{'REMOTE_USER'} || $form{'email'} || $cookie{'email'};

#****************** Huvudprogram ***
tolka_formular;
$proj_kod   = $form{'num'};

#************ Tar fram namet på användaren ***
$namn_query = "select namn from user_table where email='$email'";
$sth = $dbh->prepare($namn_query);
$rader = $sth->execute;
@namn = $sth->fetchrow_array;
$namn = $namn[0];
$dbh  -> disconnect;

#***** Skriv ut html-sidan ***
print <<_STOP_;
Content-Type: text/html

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript">

<!--
function PopUp(Anchor){
  url = "popup1.html#" + Anchor
  popUpWin =
  window.open(url,'PopUp','width=250,height=280,menubar=no,scrollbars=yes,
  toolbar=no,location=no,status=no,resizable=no');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
}
// -->
```

```
</script>
</head>

<body background="bilder/bkgrnd2.gif" ><br><br>
<FORM METHOD=POST ENCTYPE="multipart/form-data" action="$ide_prg">
<input type=HIDDEN name=proj_kod value=$proj_kod>
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
       <tr>
       <td>
       <table border="0" align="left" cellspacing="0" cellpadding="0"
       valign="top"  width=545 background="bilder/bkgrnd2.gif">
       <tr>
       <td width="12" height="25" align="left" valign="top"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
       height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="center" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/txtrubrik2.gif"
       width=191 height=21 hspace=0 vspace=0 border=0 align="middle"
       alt=""></td>
       <td width="12" align="right" valign="top"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
       height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       </tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif">
       <table border="0" align="left" cellspacing="0" cellpadding="2"
       valign="top" background="bilder/bkgrnd2.gif">
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/fomr_rubrik.gif"
       width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><INPUT TYPE=text NAME=titel
       SIZE="30"></td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
       onClick="PopUp('Rubrik')"><img src="bilder/utropstecken.gif" width=17
       height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/fomr_namn.gif" width=47
       height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><INPUT TYPE=text value="$namn"
       NAME=signatur SIZE="30"></td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
```

```
onClick="PopUp('Namn')"><img src="bilder/utropstecken.gif" width=17
height=17 hspace=0 vspace=5 border=0 align="left" alt=""></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/fomr_email.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><input name=email value="$email"
size=30></td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
onClick="PopUp('Email')"><img src="bilder/utropstecken.gif" width=17
height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></td>
</tr>
<tr>
<td width="42"  align="left" valign="bottom"
background="bilder/bkgrnd22.gif"></td>
<td width="100%" align="left" valign="top"
background="bilder/bkgrnd22.gif">   <input type=checkbox
status=checked name=chkemail value=true checked><font face=helvetica
size=2 color=silver> Meddela mig via email vid nya
inlägg</font></td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
onClick="PopUp('chkemail')"><img src="bilder/utropstecken.gif" width=17
height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/fomr_inlagg.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"></td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><textarea name=meddelande rows=8
cols=50></textarea></td>
<td width="42" align="right" valign="top"
background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
onClick="PopUp('Inlagg')"><img src="bilder/utropstecken.gif" width=17
height=17 hspace=0 vspace=5 border=0 align="left" alt=""></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/fomr_keyword.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><input name=nyckelord size=30 ><font
face=helvetica size=1 color=silver> <i>( budget, kalkyl, etc
)</i></font><input type=hidden name=keys value=note54></td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
```

```
      onClick="PopUp('Keyword')"><img src="bilder/utropstecken.gif" width=17
      height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/fomr_bifoga2.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><INPUT TYPE=file NAME=filnamn
      SIZE=30></td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
      onClick="PopUp('Bifoga')"><img src="bilder/utropstecken.gif" width=17
      height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/fomr_posta2.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="bottom" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><input  type=submit value="Posta
      Svar"></td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
      onClick="PopUp('Posta')"><img src="bilder/utropstecken.gif" width=17
      height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></td>
      </tr>
      </table>
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      </table>
      </td>
      </tr>
</table>
</form>
</body>
</html>
_STOP_

#****************** Subrutiner ***
#****************** Sub tolka_formular ***
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
```

```
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    ny_svar.cgi
# Date:       16/6-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Prints out an input-form in order to create a new answer to a
#             specific idea.
#
# CGI-variables:
#             num (idekod)
#
##############################################################################

#****************** Filnamn ***
$svar_prg = "skapa_svar.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$email = $ENV{'REMOTE_USER'} || $form{'email'} || $cookie{'email'};

#****************** Huvudprogram ***
tolka_formular;
$ide_kod   = $form{'num'};

#************ Tar fram titlen för ideen ***
$titel_query = "select titel from forum_ide where kod=$ide_kod";
$sth = $dbh->prepare($titel_query);
$rader = $sth->execute;
@title = $sth->fetchrow_array;
$titel = $title[0];

#************ Tar fram namet på användaren ***
$namn_query = "select namn from user_table where email='$email'";
$sth = $dbh->prepare($namn_query);
$rader = $sth->execute;
@namn = $sth->fetchrow_array;
$namn = $namn[0];
$dbh  -> disconnect;

#***** Skriv ut toppen av html-sidan ***
print <<_STOP_;
Content-Type: text/html
Pragma: no-cache

<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript">
<!--
function PopUp(Anchor){
  url = "popup1.html#" + Anchor
  popUpWin =
```

```
  window.open(url,'PopUp','width=250,height=280,menubar=no,scrollbars=yes,
  toolbar=no,location=no,status=no,resizable=no');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
}
// -->
</script>
</head>

<body background="bilder/bkgrnd2.gif" ><br><br>
<FORM METHOD=POST ENCTYPE="multipart/form-data" action="$svar_prg">
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
       <tr>
       <td>
       <table border="0" align="left" cellspacing="0" cellpadding="0"
       valign="top"  width=545 background="bilder/bkgrnd2.gif">
       <tr>
       <td width="12" height="25" align="left" valign="top"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
       height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="center" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/txtinlagg.gif"
       width=124 height=21 hspace=0 vspace=0 border=0 align="middle"
       alt=""></td>
       <td width="12" align="right" valign="top"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
       height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       </tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif">
       <table border="0" align="left" cellspacing="0" cellpadding="2"
       valign="top" background="bilder/bkgrnd2.gif">
       <tr>
       <td width="42" align="left" valign="top"
       background="bilder/bkgrnd22.gif"><img src="bilder/txtrubrik.gif" width=50
       height=21 hspace=0 vspace=0 border=0 align="right" alt=""></td>
       <td width="100%" align="left" valign="middle"
       background="bilder/bkgrnd22.gif"><font face="helvetica" size="2"
       color="silver">$titel</font></td>
       <td width="42" align="right" valign="top"
       background="bilder/bkgrnd22.gif"> </td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/fomr_namn.gif" width=47
       height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
```

```
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><INPUT TYPE=text value="$namn"
NAME=signatur SIZE="30"></td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
onClick="PopUp('Namn')"><img src="bilder/utropstecken.gif" width=17
height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/fomr_email.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><input name="email" value="$email"
size=30></td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
onClick="PopUp('Email')"><img src="bilder/utropstecken.gif" width=17
height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/fomr_inlagg.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"></td>
<td width="42" align="right" valign="top"
background="bilder/bkgrnd22.gif"> </td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><textarea name=meddelande rows=10
cols=50></textarea></td>
<td width="42" align="right" valign="top"
background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
onClick="PopUp('Inlagg')"><img src="bilder/utropstecken.gif" width=17
height=17 hspace=0 vspace=0 border=0 align="left" alt=""></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/fomr_bifoga.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><INPUT TYPE=file NAME=filnamn
SIZE=30></td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
onClick="PopUp('Bifoga')"><img src="bilder/utropstecken.gif" width=17
height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></a></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/fomr_posta.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="bottom" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><input  type=submit value="Posta
Inlägg"></td>
```

```
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
      onClick="PopUp('Posta')"><img src="bilder/utropstecken.gif" width=17
      height=17 hspace=0 vspace=5 border=0 align="left" alt="Hjälp"></a></td>
      </tr>
      </table>
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      </table>
</td>
</tr>
</table>
<input type=HIDDEN name=ide_kod value=$ide_kod>
</form>
</body>
</html>
_STOP_



#****************** Subrutiner ***
#****************** Sub tolka_formular ***
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   projinfo.cgi
# Date:      10/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out both the specific information about the requested
#            project, and if there are any user related to this project.
#
# CGI-variables:    num (projektkod)
#
##############################################################################

#****************** Filnamn ***
$frame_prg = "../beslutsbank/frame_popup.cgi";
$remove_prg = "remove.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;

#******** Skriv ut ändrings formuläret *****************
print "Content-Type: text/html\nPragma: no-cache\n\n";

#************ räknar antalet tagna beslut i bank_kort tabellen ***
$beslut_query = "select count(*) from bank_kort where proj_kod = $form{num}";
$sth = $dbh->prepare($beslut_query);
$rader = $sth->execute;
@beslut = $sth->fetchrow_array;
$beslut_count = $beslut[0];
#*****

#************ Hämtar projektinformation från tabellen proj ***
$proj_query = "select * from proj where proj_kod = $form{num}";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
@proj = $sth->fetchrow_array;
#****

print <<_HTML_;
<title>Organizational decision support</title>
<script language="JavaScript"><!--
function PopUp(Anchor){
 url = Anchor;
  popUpWin = window.open(url,'PopUp','width=644,height=462');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
}
```

```
// -->
</script>
<body background=\"bilder/bkgrnd2.gif\"  alink=teal link=silver vlink=teal>
<br><br>
<FORM action="$frame_prg" target="PopUp">
<input type=hidden name=funktion value=info>
<input type=hidden name=num value=$form{num}>
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
       <tr>
       <td>
       <table border="0" align="left" cellspacing="0" cellpadding="0"
       valign="top"  width=601 background="bilder/bkgrnd2.gif">
       <tr>
       <td width="12" height="25" align="left" valign="top"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
       height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" height="35" align="center" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/form_proj_info.gif"
       width=272 height=21 hspace=0 vspace=0 border=0 align="middle"
       alt=""><br><hr></td>
       <td width="12" align="right" valign="top"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
       height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif">
       <table border="0" align="left" cellspacing="0" cellpadding="8"
       valign="top" background="bilder/bkgrnd2.gif">
       <tr>
       <td width="42" height="40" align="left" valign="middle"
       background="bilder/bkgrnd22.gif"><img src="bilder/form_proj_1.gif"
       width=47 height=30 hspace=0 vspace=0 border=0 align="right" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif">
       <font face=helvetica size=3 face=helvetica color=silver>$proj[2]</font>
               
       <img src="bilder/form_proj_2.gif" width=47 height=30 hspace=0 vspace=0
       border=0 alt="">
       <font face=helvetica size=3 face=helvetica
       color=silver> $proj[0]</font>
       </td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       </tr>
       <tr>
       <td width="42" height="20" align="left" valign="top"
       background="bilder/bkgrnd22.gif">
       <img src="bilder/form_proj_3.gif" width=47 height=30 hspace=0 vspace=0
       border=0 align="bottom" alt="">
       </td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif">
       <br>
       <font face=helvetica size=2 face=helvetica color=silver>$proj[3]</font>
       </td>
```

```
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif">
</td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/form_proj_4.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="right" alt=""></td>
<td width="100%" height="60"  valign="middle"
background="bilder/bkgrnd22.gif">
<font face=helvetica size=3 face=helvetica
color=silver> $beslut_count st </font>
     <input type=submit value="Visa tagna beslut"
onclick="javascript:PopUp()">
</td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
</tr>
</table>
</td>
<td width="12" align="right" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
<td width="12" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
</tr>
</table>
</td>
</tr>
</table>
</table>
</form>

<FORM ACTION="$remove_prg" METHOD="POST">
<table width="0" border="0" cellspacing="0" cellpadding="0"
align="center" valign="TOP"  background="bkgrnd2.gif" nowrap>
<tr>
<td>
<table border="0" align="left" cellspacing="0" cellpadding="0"
valign="top"  width=601 background="bilder/bkgrnd2.gif">
<tr>
<td width="46" height="25" align="left" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="center" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/form_proj_6.gif"
width=272 height=21 hspace=0 vspace=0 border=0 align="middle"
alt=""></td>
<td width="12" align="right" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
</tr>
```

```
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20">
      <font face=helvetica size=2 face=helvetica color=silver>
      <hr> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <table border="0" align="left" cellspacing="0" cellpadding="5"
      valign="top" background="bilder/bkgrnd2.gif">
      <tr>
      <td width="110" height="20" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=3 face=helvetica color=silver>Ansvar</font>
      </td>
      <td  width="140" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=3 face=helvetica color=silver>Namn</font>
      </td>
      <td  width="160" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=3 face=helvetica color=silver>Email</font>
      </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=3 face=helvetica color=silver>Anknytning</font>
      </tr>
_HTML_

#************ Hämtar ansvarsfördelningen från user_table tabellen ***
$userinfo_query = "select user_table.*, user_proj.ansvar from user_table where
user_table.kod = user_proj.kod and user_proj.proj_kod = $form{num}";
$sth = $dbh3->prepare($userinfo_query);
$rader = $sth->execute;
for ($k = 0; $k < $rader; $k++)
{
@userinfo = $sth->fetchrow_array;
$namn = $userinfo[1];
$ansvar = $userinfo[9];
$email = $userinfo[5];
$tel = $userinfo[2];
$mobil = $userinfo[3];
$sok = $userinfo[4];

print <<_HTML_;
      <tr>
      <td width="110" height="20" nowrap align="left" valign="top"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica
      color=silver><i>$ansvar</i></font>
      </td>
```

```
      <td width="140" nowrap align="left" valign="top"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>$namn</font>
      </td>
      <td nowrap width="160" align="left" valign="top"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>$email</font>
      </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>Tel:
      <i>$tel</i><br>
      Mobil: <i>$mobil</i><br>
      Sök: <i>$sok</i></font>
      </td>
      </tr>
_HTML_
}
#****************************

print <<_HTML_;
</table>
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
</table>
</td>
</tr>
</table>
</form>
</body>
</html>
_HTML_

#*** Stänger databaskopplingar ***
$dbh -> disconnect;
$dbh2 -> disconnect;
$dbh3 -> disconnect;

#****************** Subrutiner ***
#****************** Sub tolka_formular ***
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
```

```
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}

#****************** felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   show_ide.cgi
# Date:      8/6-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out a list of all the answers related to a specific idea.
#
# CGI-variables:
#            num (idekod)
#
##############################################################################

#****************** Filnamn ***
$svar_prg = "show_svar.cgi";
$frame_prg = "../script/frame.cgi";
#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
sub fixa_datum;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;

#****** Hämtar en ide ***
$ide_query = "select * from forum_ide where kod = $form{\"num\"}";
$sth = $dbh->prepare($ide_query);
$rader = $sth->execute;
@ide = $sth->fetchrow_array;
$filkod = $ide[7];
$fil = "";
if($filkod)  #*** finns det attachment, i så fall hämtas det **
{
 #************ Hämtar eventuellt attachment  ***
 $attach_query = "select * from forum_attach where filkod = $filkod";
 $sth2 = $dbh2->prepare($attach_query);
 $rader = $sth2->execute;
 @attach = $sth2->fetchrow_array;
 #************
 $fil = "Bifogad fil: <A HREF=$attach[2]/$attach[3]>$attach[1]</A>";
}

fixa_datum $ide[3]; #*** gör läsbart datum ***

#***** Skriv ut toppen av html-sidan ***
print <<_STOP_;
Content-Type: text/html
Pragma: no-cache

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Organizational decision support</title>
```

```
<script language="JavaScript">
<!--
function PopUp(Anchor){
 url = Anchor;
  popUpWin = window.open(url,'PopUp','width=575,height=455');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
}
// -->
</script>
</head>

<body background=bilder/bkgrnd2.gif alink=teal link=silver vlink=teal>
<FORM METHOD=POST action="javascript:void(0)"><br><br>
<table width= border=0  cellspacing=0 cellpadding=0 align=center valign=TOP
background=bkgrnd2.gif nowrap>
       <tr>
       <td>
       <table border=0 align=left cellspacing=0 cellpadding=0  valign=top
       width=585 background=bilder/bkgrnd2.gif>
       <tr>
       <td width=12 height=25 align=left valign=top
       background=bilder/bkgrnd22.gif><img src=bilder/corner1.gif width=12
       height=11 hspace=0 vspace=0 border=0 align=left alt=></td>
       <td width=100% align=center valign=bottom background=bilder/bkgrnd22.gif>
       <img src=bilder/people.gif width=20 height=19 hspace=0 vspace=0 border=0
       align=left alt=>
       <font face=helvetica size=3 color=silver><b>$ide[1]</b></font></td>
       <td width=12 align=right valign=top background=bilder/bkgrnd22.gif><img
       src=bilder/corner2.gif width=11 height=12 hspace=0 vspace=0 border=0
       align=right  alt=></td>
       </tr>
       <td width=12 align=left valign=bottom background=bilder/bkgrnd22.gif
       height=20> </td>
       <td width=100% align=left valign=bottom background=bilder/bkgrnd22.gif>
       <table border=0 align=center cellspacing=0 cellpadding=2  valign=top
       background=bilder/bkgrnd2.gif>
       <tr align=middle>
       <td width=42 height=10 align=left valign=middle
       background=bilder/bkgrnd22.gif><img src=bilder/txtavsandare.gif width=79
       height=21 hspace=0 vspace=0 border=0 align=left alt=></td>
       <td  align=left valign=middle background=bilder/bkgrnd22.gif><font
       face=helvetica size=2 color=silver>$ide[2]</b></font></td>
       <td width=62 align=left valign=middle
       background=bilder/bkgrnd22.gif> </td>
       <td width=42 height=10 align=left valign=middle
       background=bilder/bkgrnd22.gif><img src=bilder/txtdatum.gif width=50
       height=17 hspace=0 vspace=0 border=0 align=right alt=></td>
       <td  align=left valign=middle background=bilder/bkgrnd22.gif><font
       face=helvetica size=2 color=silver>$datum</font></td>
       </tr>
       </table>
       </td>
       <td width=12 align=right valign=bottom background=bilder/bkgrnd22.gif
       height=20> </td>
       <tr>
       </tr>
       <tr>
```

```
      <td  width=12 align=left valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      <td width=100% align=left valign=bottom
      background=bilder/bkgrnd22.gif><img src=bilder/txtinlagg2.gif width=50
      height=17 hspace=0 vspace=0 border=0 align=bottom alt=><br>
      <font face=helvetica size=2 color=silver>$ide[4]<br><br>$fil
      </font>
      </td>
      <td width=12 align=right valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      </tr>
      <tr>
      <td width=12 align=left valign=bottom background=bilder/bkgrnd22.gif><img
      src=bilder/corner3.gif width=12 height=11 hspace=0 vspace=0 border=0
      align=left alt=></td>
      <td width=100% align=left valign=bottom
      background=bilder/bkgrnd22.gif> </td>
      <td width=12 align=right valign=bottom
      background=bilder/bkgrnd22.gif><img src=bilder/corner4.gif width=11
      height=12 hspace=0 vspace=0 border=0 align=right alt=></td>
      </tr>
      </table>
      </td>
      </tr>
</table>
<br>
_STOP_

#************ Hämtar svar till denna ide ***
$svar_query = "select * from forum_svar where ide_kod = $ide[0] order by kod
desc";
$sth = $dbh->prepare($svar_query);
$rader = $sth->execute;
#************

print <<_STOP_;
<center><input type=submit value="Visa relaterade belslut"
onClick="PopUp('$frame_prg?funktion=forum_popup&ide=$form{ide}')"></center>
<br>
<table width= border=0  cellspacing=0 cellpadding=0 align=center valign=TOP
background=bkgrnd2.gif nowrap>
      <tr>
      <td>
      <table border=0 align=left cellspacing=0 cellpadding=0  valign=top
      width=585 background=bilder/bkgrnd2.gif>
      <tr>
      <td width=12 height=25 align=left valign=top
      background=bilder/bkgrnd22.gif><img src=bilder/corner1.gif width=12
      height=11 hspace=0 vspace=0 border=0 align=left alt=></td>
      <td width=100% align=center valign=bottom background=bilder/bkgrnd22.gif>
      <img src=bilder/closeup.gif width=11 height=11 hspace=0 vspace=0 border=0
      align=left alt=>
      <font face=helvetica size=3 color=silver><b>Svar p&aring;
      inl&auml;gget</b></font></td>
      <td width=12 align=right valign=top background=bilder/bkgrnd22.gif><img
      src=bilder/corner2.gif width=11 height=12 hspace=0 vspace=0 border=0
      align=right  alt=></td>
      </tr>
```

```
      <td width=12 align=left valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      <td width=100% align=left valign=bottom
      background=bilder/bkgrnd22.gif> </td>
      <td width=12 align=right valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      </tr>
      <tr>
      <td  width=12 align=left valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      <td width=100% align=left valign=bottom background=bilder/bkgrnd22.gif>
_STOP_

print"<table border=0 cellpadding=2 align=center>";
$blank ="";
$tom = 'true';
$lines = 0;
for ($i = 0; $i < $rader; $i++)
{
  @svar = $sth->fetchrow_array;
  $tom ='false';
  fixa_datum $svar[3];

print <<_STOP_;
      <tr>
       <td valign=top nowrap width=300><font face=helvetica size=2 color=silver>
      $blank<a HREF=\"$svar_prg?num=$svar[0]&ide=$form{ide}\">Re:
      $ide[1]</a>     [<b>$svar[2]</b>]</font></td>
       <td valign=top nowrap><font face=helvetica size=2
      color=silver>$datum</font></td>
      </tr>
_STOP_
  if ($lines==10)
  {
    $blank =" \;";
    $lines =0;
  }
  $lines++;
  $blank =" \;".$blank;
}
if ($tom eq 'true'){
print <<_STOP_;
      <tr>
       <td valign=top nowrap width=300><font face=helvetica size=2 color=silver>
       </td>
       <td valign=top nowrap><font face=helvetica size=2
      color=silver> </td>
      </tr>
_STOP_
}

print <<_STOP_;
      </table>
      </td>
      <td width=12 align=right valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      </tr>
      <tr>
```

```
      <td width=12 align=left valign=bottom background=bilder/bkgrnd22.gif><img
      src=bilder/corner3.gif width=12 height=11 hspace=0 vspace=0 border=0
      align=left alt=></td>
      <td width=100% align=left valign=bottom
      background=bilder/bkgrnd22.gif> </td>
      <td width=12 align=right valign=bottom
      background=bilder/bkgrnd22.gif><img src=bilder/corner4.gif width=11
      height=12 hspace=0 vspace=0 border=0 align=right alt=></td>
      </tr>
      </table>
      </td>
      </tr>
      </table>
</form>
</body>
</html>
_STOP_

#*** Stäng databaskoppling ***
$dbh -> disconnect;
$dbh2 -> disconnect;

#****************** Subrutiner ***********
#****************** Sub tolka_formular ***
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
#****************** Sub fixa_datum ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5  $4";
  return $datum;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    show_prem.cgi
# Date:       9/8-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Prints out a list of all ideas within a specific project, in order
#             to make subscriptions.
#
# CGI-variables:
#             email
#
##############################################################################

#****************** Filnamn ***
$show_prg = "show_prem.cgi";
$skapa_prg = "skapa_prem.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub fixa_datum;
sub tolka_formular;
sub felkontroll;
sub tolka_kaka;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;
tolka_kaka;

$email = $ENV{'REMOTE_USER'} || $form{'email'} || $cookie{'email'};
$kodat_email = $email;
$kodat_email =~ s/([=; \n%])/sprintf("%%%02X", ord ($1))/eg;
@prem2='';

#***** Skriv ut toppen av html-sidan ***
print <<_HEAD_;
Set-Cookie: email=$kodat_email; path=/;
Content-Type: text/html\nPragma: no-cache

_HEAD_

if(!$email)
{
print <<_TOP_;
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
      <title>Prenumeration</title>
</head>
<body background=bilder/bkgrnd2.gif alink=teal link=silver vlink=teal>
<br><br><br><br><br><br>
<form action=$show_prg>
<input type=hidden name=num value=$form{num}>
```

```
<center>
<table>
<tr><td>
<b><FONT face="" size=3 >Ange emailadress:</FONT></b>
</td></tr>
<tr><td>
<input type=text name=email size=33 width=43> <input type=submit
value='skicka'>
</td></tr>
</table>
</center>
</form>
</body>
</html>
_TOP_
}
else
{
 #************ Hämtar en prenumeration från forum_prem ***
 $prem_query = "select * from forum_prem where email = '$kodat_email'";
 $sth = $dbh2->prepare($prem_query);
 $rader = $sth->execute;
 #************
#print"$prem_query";
#print"$rader";
 $j=0;
 for ($i = 0; $i < $rader; $i++)
 {
   @prem = $sth->fetchrow_array;
   if ($j<1){
   $prem2 = "$prem[2]";
 }
 else
 {
   $prem2 = "$prem2, $prem[2]";
 }
 $j++;
}
@prem2 = split ", ", $prem2;

print <<_TOP_;
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Prenumeration</title>
</head>
<form action="$skapa_prg">
<input type=hidden name=email value=$email>
<body background=bilder/bkgrnd2.gif alink=teal link=silver vlink=teal>
<input type=hidden name=num value=$form{num}>
<center><b><FONT face="" size=2 >Markera de beslut som du vill följa och på
vilket sätt, klicka sedan på knappen "Prenumerera" !</FONT></b></center>
<br>
<table width=522 border=0 cellspacing=0 cellpadding=3 align=center>
       <tr >
       <td>
       <table width=600 bgcolor=black border=2 >
       <tr bgcolor=#e8eae9>
       <td background=bilder/bkgrnd22.gif>
```

```
_TOP_

#************ Hämtar en ide ***
$ide_query = "select * from forum_ide where proj_kod=$form{\"num\"}";
$sth = $dbh->prepare($ide_query);
$rader = $sth->execute;
#************

for ($i=0; $i<$rader; $i++)
{
  @ide = $sth->fetchrow_array;
  $datum = fixa_datum $ide[3];
       #**********prem check**************
       $chkbox_value = '';
       foreach $prem_lista (@prem2)
       {
         if ($ide[0] eq $prem_lista)
           {$chkbox_value = 'checked'; last}
         else
           {$chkbox_value = '';}
       }
       #*********************************

print <<_STOP_;
       <!-- Ny Prenumerering -->
       <table width=100% border=0 cellspacing=0 cellpadding=1>
       <tr>
       <td align="left" background=bilder/bkgrnd22.gif >
       <IMG  alt=* src="bilder/people.gif" useMap=""></td>
       <td  align="left" background=bilder/bkgrnd22.gif ><input type="checkbox"
       name="chkbox" value=$ide[0] $chkbox_value></td>
       <td nowrap  valign="top" background=bilder/bkgrnd22.gif> <font
       face=helvetica size=1 color=silver><i>$datum</i></font></td>
       <td width=195   nowrap background=bilder/bkgrnd22.gif><font
       face=helvetica size=3 color=silver>$ide[1]</font></td>
       <td width=100  nowrap background=bilder/bkgrnd22.gif ><font
       face=helvetica size=-1 color=silver> [$ide[2]]</font></td>
       </tr>
       </table>
_STOP_
}

print <<_STOP_;
       </td>
       </tr>
       </table>
       </td>
       </tr>
       <tr>
       <td>

       <table border=2>
       <tr bgcolor=#e8eae9>
       <td background=bilder/bkgrnd22.gif>
       <table border=0  width=589>
       <tr>
       <td valign="bottom" background=bilder/bkgrnd22.gif ><font face=helvetica
       size=3 color=silver>  </td>
       <td width=10 background=bilder/bkgrnd22.gif> </td>
```

```
      <td valign="bottom" background=bilder/bkgrnd22.gif><font face=helvetica
      size=3 color=silver>Epost:</FONT> </td>
      <td width=10 background=bilder/bkgrnd22.gif> </td>
      <td width=10 background=bilder/bkgrnd22.gif> </td>
      <td align=right background=bilder/bkgrnd22.gif></td>
      </tr>
      <tr bgcolor=#e8eae9>
      <td background=bilder/bkgrnd22.gif><font face=helvetica size=3
      color=silver></FONT></td>
      <td width=10 background=bilder/bkgrnd22.gif> </td>
      <td background=bilder/bkgrnd22.gif><font face=helvetica size=3
      color=silver>$kodat_email</FONT> </td>
      <td width=10 background=bilder/bkgrnd22.gif> </td>
      <td width=170 nowrap align=right background=bilder/bkgrnd22.gif></td>
      <td align=right width=40 background=bilder/bkgrnd22.gif><input
      type="submit" size = "1"  name="skicka" value="Prenumerera"></td>
      </tr>
      </table>
      </td>
      </tr>
      </table>
      </td>
      </tr>
      </table>
</FORM>
</body>
</html>
_STOP_
}

#*** Stäng databaskoppling ***
$dbh -> disconnect;
$dbh2 -> disconnect;

#****************** Subrutiner ***
#****************** Sub fixa_datum ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5  $4";
  return $datum;
}

#****************** Sub tolka_formular ***
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
```

```
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}

#****************** Sub tolka_kaka ***
sub tolka_kaka
{
  my (@par, $email, $varde);
  return unless $ENV{'HTTP_COOKIE'};

  @par = split (/; /,$ENV{'HTTP_COOKIE'});

  foreach $par (@par)
  {
    ($email, $varde) = split(/=/, $par);
    foreach $x ($email, $varde)
      {$x =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;}
    $cookie{$email}=$varde unless $cookie{$email};
  }
}

#****************** Sub felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    show_svar.cgi
# Date:       9/6-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Prints out the information of a requested answer and list the
#             rest, which are related to the same idea.
#
# CGI-variables:
#             num (idekod)
#
##############################################################################

#****************** Filnamn ***
$frame_prg ="../script/frame.cgi";
$svar_prg = "show_svar.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
sub fixa_datum;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;

#************ Hämtar ett svar ***
$svar_query = "select * from forum_svar where kod = $form{\"num\"}";
$sth = $dbh->prepare($svar_query);
$rader = $sth->execute;
@svar = $sth->fetchrow_array;
#************
$ide = @svar[1];

#************ Hämtar titlen till ideen ***
$ide_query = "select * from forum_ide where kod = $ide";
$sth2 = $dbh2->prepare($ide_query);
$rader2 = $sth2->execute;
@ide = $sth2->fetchrow_array;
#************
$filkod = $svar[7];
$fil = "";

if($filkod)
{
 #************ Hämtar eventuellt attachment  ***
 $attach_query = "select * from forum_attach where filkod = $filkod";
 $sth2 = $dbh2->prepare($attach_query);
 $rader = $sth2->execute;
 @attach = $sth2->fetchrow_array;
 #************
 $fil = "Bifogad fil: <A HREF=$attach[2]/$attach[3]>$attach[1]</A>";
```

```
}
fixa_datum $svar[3]; #*** Skapa ett läsbart datum ***

#***** Skriv ut toppen av html-sidan ***
print <<_STOP_;
Content-Type: text/html
Pragma: no-cache

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript">
<!--
function PopUp(Anchor){
 url = Anchor;
  popUpWin = window.open(url,'PopUp','width=575,height=455');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
}
// -->
</script>
</head>
<body background=bilder/bkgrnd2.gif alink=teal vlink=teal link=silver><br><br>
<FORM METHOD=POST action="javascript:void(0)">
<!--input type=HIDDEN name=num value=$form{num}>
<input type=HIDDEN name=funktion value=$form{funktion}-->
<table width= border=0  cellspacing=0 cellpadding=0 align=center valign=TOP
background=bkgrnd2.gif nowrap>
       <tr>
       <td>
       <table border=0 align=left cellspacing=0 cellpadding=0  valign=top
       width=585 background=bilder/bkgrnd2.gif>
       <tr>
       <td width=12 height=25 align=left valign=top
       background=bilder/bkgrnd22.gif><img src=bilder/corner1.gif width=12
       height=11 hspace=0 vspace=0 border=0 align=left alt=></td>
       <td width=100% align=center valign=bottom background=bilder/bkgrnd22.gif>
       <img src=bilder/people.gif width=20 height=19 hspace=0 vspace=0 border=0
       align=left alt=>
       <font face=helvetica size=3 color=silver><b>Re: $ide[1]</b></font></td>
       <td width=12 align=right valign=top background=bilder/bkgrnd22.gif><img
       src=bilder/corner2.gif width=11 height=12 hspace=0 vspace=0 border=0
       align=right  alt=></td>
       </tr>
       <td width=12 align=left valign=bottom background=bilder/bkgrnd22.gif
       height=20> </td>
       <td width=100% align=left valign=bottom background=bilder/bkgrnd22.gif>
       <table border=0 align=center cellspacing=0 cellpadding=2  valign=top
       background=bilder/bkgrnd2.gif>
       <tr align=middle>
       <td width=42 height=10 align=left valign=middle
       background=bilder/bkgrnd22.gif><img src="bilder/txtinfordav.gif" width=71
       height=21 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td  align=left valign=middle background=bilder/bkgrnd22.gif><font
       face=helvetica size=2 color=silver>$svar[2]</b></font></td>
       <td width=62 align=left valign=middle
       background=bilder/bkgrnd22.gif> </td>
```

```
      <td width=42 height=10 align=left valign=middle
      background=bilder/bkgrnd22.gif><img src=bilder/txtdatum.gif width=50
      height=17 hspace=0 vspace=0 border=0 align=right alt=></td>
      <td  align=left valign=middle background=bilder/bkgrnd22.gif><font
      face=helvetica size=2 color=silver>$datum</font></td>
      </tr>
      </table>
      </td>
      <td width=12 align=right valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      <tr>
      </tr>
      <tr>
      <td  width=12 align=left valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      <td width=100% align=left valign=bottom
      background=bilder/bkgrnd22.gif><img src="bilder/txtsvar.gif" width=38
      height=18 hspace=0 vspace=0 border=0 align="left" alt=""><br>
      <font face=helvetica size=2 color=silver>$svar[4]<br><br>$fil</font>
      </td>
      <td width=12 align=right valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      </tr>
      <tr>
      <td width=12 align=left valign=bottom background=bilder/bkgrnd22.gif><img
      src=bilder/corner3.gif width=12 height=11 hspace=0 vspace=0 border=0
      align=left alt=></td>
      <td width=100% align=left valign=bottom
      background=bilder/bkgrnd22.gif> </td>
      <td width=12 align=right valign=bottom
      background=bilder/bkgrnd22.gif><img src=bilder/corner4.gif width=11
      height=12 hspace=0 vspace=0 border=0 align=right alt=></td>
      </tr>
      </table>
      </td>
      </tr>
      </table>
<br>
_STOP_

#************ Hämtar övriga svar ***
$svar_query = "select * from forum_svar where ide_kod = $ide order by kod
desc";
$sth = $dbh->prepare($svar_query);
$rader = $sth->execute;
#************

print<<_BESLUTSKORT_MAIN_;
      <center><input type=submit value="Visa relaterade belslut"
      onClick="PopUp('$frame_prg?funktion=forum_popup&ide=$form{ide}')"></cente
      r>
_BESLUTSKORT_MAIN_

print <<_STOP_;
      <br>
      <table width= border=0  cellspacing=0 cellpadding=0 align=center
      valign=TOP  background=bkgrnd2.gif nowrap>
      <tr>
      <td>
```

```
      <table border=0 align=left cellspacing=0 cellpadding=0  valign=top
      width=585 background=bilder/bkgrnd2.gif>
      <tr>
      <td width=12 height=25 align=left valign=top
      background=bilder/bkgrnd22.gif><img src=bilder/corner1.gif width=12
      height=11 hspace=0 vspace=0 border=0 align=left alt=></td>
      <td width=100% align=center valign=bottom background=bilder/bkgrnd22.gif>
      <img src=bilder/closeup.gif width=11 height=11 hspace=0 vspace=0 border=0
      align=left alt=>
      <font face=helvetica size=3 color=silver><b>Svar på
      inlägget</b></font></td>
      <td width=12 align=right valign=top background=bilder/bkgrnd22.gif><img
      src=bilder/corner2.gif width=11 height=12 hspace=0 vspace=0 border=0
      align=right  alt=></td>
      </tr>
      <td width=12 align=left valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      <td width=100% align=left valign=bottom
      background=bilder/bkgrnd22.gif> </td>
      <td width=12 align=right valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      </tr>
      <tr>
      <td  width=12 align=left valign=bottom background=bilder/bkgrnd22.gif
      height=20> </td>
      <td width=100% align=left valign=bottom background=bilder/bkgrnd22.gif>
      <table border=0 cellpadding=2 align=center>
_STOP_

$blank ="";
$marker ="";
$tom = 'true';
$lines = 0;
for ($i = 0; $i < $rader; $i++)
{
 @svar = $sth->fetchrow_array;
 fixa_datum $svar[3];
$tom ='false';if($svar[0] == $form{"num"}){$marker="<img
src=../bilder/closeup2.gif> ";}
print <<_STOP_;
      <tr>
       <td valign=top nowrap width=300><font face=helvetica size=2 color=silver>
      $blank $marker<A HREF=\"$svar_prg?num=$svar[0]&ide=$form{ide}\">Re:
      $ide[1]</a>     [<b>$svar[2]</b>]</font></td>
      <td valign=top nowrap><font face=helvetica size=2
      color=silver>$datum</font></td>
      </tr>
_STOP_

$blank =" \;".$blank;

if ($lines==10)
{
  $blank =" \;";
  $lines =0;
}
  $lines++;
  $marker ="";
}
```

```
if ($tom eq 'true')
{
print <<_STOP_;
       <tr>
       <td valign=top nowrap width=300><font face=helvetica size=2 color=silver>
        </td>
       <td valign=top nowrap><font face=helvetica size=2
       color=silver> </td>
       </tr>
_STOP_
}

print <<_STOP_;
       </table>
       </td>
       <td width=12 align=right valign=bottom background=bilder/bkgrnd22.gif
       height=20> </td>
       </tr>
       <tr>
       <td width=12 align=left valign=bottom background=bilder/bkgrnd22.gif><img
       src=bilder/corner3.gif width=12 height=11 hspace=0 vspace=0 border=0
       align=left alt=></td>
       <td width=100% align=left valign=bottom
       background=bilder/bkgrnd22.gif> </td>
       <td width=12 align=right valign=bottom
       background=bilder/bkgrnd22.gif><img src=bilder/corner4.gif width=11
       height=12 hspace=0 vspace=0 border=0 align=right alt=></td>
       </tr>
       </table>
       </td>
       </tr>
       </table>
<!-- Start of Client Side Image Map information -->
<MAP NAME="relaterade">
<!-- #$DATE:Fri Jun 18 07:53:44 1999 -->
<!-- #$GIF:relaterade.gif -->
<AREA SHAPE=RECT COORDS="0,0,77,28" href="javascript:void(0)"
onClick="PopUp('$frame_prg?funktion=forum_popup&ide=$form{ide}')">
</MAP>
<!-- End of Client Side Image Map information -->
</body>
</html>
_STOP_

#*** Stäng databaskopplingen ***
$dbh -> disconnect;

#****************** Subrutiner ***************************
#****************** Sub tolka_formular ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
```

```
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}

#****************** Sub fixa_datum ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5  $4";
  return $datum;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    skapa_ide.cgi
# Date:       16/6-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Creates a new record in the forum_ide table based on the
#             information given in the input-form.
#
# CGI-variables:
#             titel, namn, email, meddelande, keys, fil, proj_kod
#
# Stored in DB:
#             kod, titel, signatur, Date, meddelande, email, nyckelord, filkod
#             filnamn, path, proj_kod
#
##############################################################################

#****************** Filnamn ***
$filkatalog = "filer";
$frame_prg = "../script/frame.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_multipart;
sub slumpstrang;
sub ladda_upp_fil;
sub lagra_attachment;
sub felkontroll;
sub koda_till_mac;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$ENV{'PATH'} = '/bin:/usr/bin:/usr/local/bin';
$datum = `date`;

#****************** Huvudprogram ***
print "Content-Type: text/html\n\n<body background=bilder/bkgrnd2.gif>";
srand;
tolka_multipart;

#***** Felkontroller ***
if ($form{'proj_kod'} eq "")    {felkontroll "projekt";}
if ($form{'titel'} eq "")       {felkontroll "titel";}
if ($form{'meddelande'} eq "")  {felkontroll "meddelande";}
if ($form{'email'} =~ m/@.+\.\w{2,3}$/ || $form{'email'} eq ""){$check = "ok";}
else {felkontroll "epost";}

if ($form{'signatur'} eq "") {$form{'signatur'} = "Anonym";}
#if ($form{'email'} eq "") {$form{'email'} = "null";}
#if ($form{'chkemail'} eq "") {$form{'email'} = "null";}
#**********************

#***** Koda om å,ä och ö samt fixa avkodning av specialtecken ***
koda_till_mac ("titel","meddelande","nyckelord","signatur");
$form{"meddelande"} =~ s/\n/<BR>/gs;  #** Radmatningat till html
```

```
#************ Tar fram högsta nummer bland ideer ***
$kod_query = "select max(kod) from forum_ide";
$sth = $dbh->prepare($kod_query);
$rader = $sth->execute;
@count = $sth->fetchrow_array;
$kod = $count[0]+1;

#** Bryt ut filnamnet från sökvägen.
#** Och ladda upp fil om det finns någon.
$fil_namn =~ m/([^\/\\:]*)$/;
$fil_namn = $1;
$fil_lst = `ls -l $form{'filnamn'}`;
$fil_lst =~ m/www\s+(\d+)/;
$storlek = $1;

if($storlek>3)
{
  ladda_upp_fil;
  lagra_attachment;
}
else {
  $filkod = "null";
}

#*** Skriv ut resultat
print <<_FOT_;

<BR>   Titel: $form{'titel'}
<BR>   Namn: $form{'signatur'}
<BR>   Email: $form{'email'}
<BR>   Text: $form{'meddelande'}
<BR>   Keys: $form{'nyckelord'}
<BR>   Filnamn: $fil_namn
<BR>   Storlek: $storlek bytes
<BR>   Datum: $datum
<BR>   End: $end
<BR>   Projekt: $form{'proj_kod'}
_FOT_

#*********** Spara ny ide i databasen ************
$rv = $dbh->do("insert into forum_ide values
              ($kod,'$form{'titel'}','$form{'signatur'}',
               '$datum','$form{'meddelande'}','$form{'email'}',
               '$form{'nyckelord'}',$filkod, $form{'proj_kod'});");
if ($rv == 1)
{
 print " <BR><H2><CENTER>Uppdateringen utf&ouml;rd<BR></H2><BR>\<a
href=\"$frame_prg?funktion=forum&num=$form{'proj_kod'}\" target=right><< Åter
till forum</a>";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej!!, var god f&ouml;rs&ouml;k
senare!<BR></H2>";
}

#*** Stäng databaskopplingarna ***
$dbh  -> disconnect;
```

```
$dbh2 -> disconnect;

#****************** Subrutiner ***
#****************** Sub Ladda fil ***
sub ladda_upp_fil
{
	my ($faktiskt_namn, $K, $rad, $andelse);

	# Ge filen ett slumpmässigt namn
	do {$faktiskt_namn = int(rand 100000).".asis";}
		while -e "$filkatalog/$faktiskt_namn";

	$faktiskt_namn = "$fil_namn"._."$faktiskt_namn";
	$slump_namn = $faktiskt_namn;
	# Om ingen Content-Type har angetts, försök bestämma den
	# genom att titta på filändelsen.
	if (!$form{'fil','Content-Type'})
	{

		# Detta är den default Content-Type som används om
		# ingen lämplig hittas
		$form{'fil','Content-Type'} = 'application/x-unknown';

#		# Finn ändelsen
#		($andelse) = $form{'fil','filnamn'} =~ /\.([^.]*)$/;
#
#		# Matcha ändelsen mot raderna i filen mime.types
#
#		open (MIME, "<mime.types") or die (print "kan ej öppna open: $!");
#		while ($rad = <MIME>)
#		{
#				if ($rad =~ /^(.*?)\s.*\b$andelse\b/)
#					{$form{'fil','Content-Type'} = $1;}
#		}
#		close MIME;
	}

	# Skriv ut en lämplig header till ASIS-filen
	open (ASIS, ">$filkatalog/$faktiskt_namn")
		or die "open: $!";
	print ASIS <<_HUVUD_;
Status: 200 OK
Content-Type: $form{'fil','Content-Type'}

_HUVUD_
	# Lägg till den temporära filens innehåll

	open (TEMP, "<$form{'filnamn'}") or die (print "kan ej öppna!!<P>");
	print ASIS $rad while $rad = <TEMP>;
	close TEMP;
	  close ASIS;

	# Radera den temporära filen, vi behöver den inte mer
	unlink "$form{'filnamn'}";

	# Radera HTML-markörer från beskrivningen och det
	# önskade filnamnet.
	foreach $_ ($form{'beskrivning'}, $form{'filnamn'})
		{$_ =~ s/([<>])/$1 eq "<" ? "&lt;" : "&gt;"/ge}
```

```
	# Beräkna filstorleken i K
	$K = 1+int((-s "$filkatalog/$faktiskt_namn")/1024);

}

#****************** Sub tolka multipart formulär ***
sub tolka_multipart
{
	# Om innehållstypen inte är multipart/form-data, anropa
	# den gamla tolka_formular-rutinen.
	if ($ENV{'CONTENT_TYPE'} !~ /^multipart\/form-data/)
	{
		tolka_formular;
		return;
	}

	my ($grans, $rad, $temp_fil, $index, $falttyp,
		$nasta_falttyp);

	# Extrahera gränssträngen
	($grans) = $ENV{'CONTENT_TYPE'} =~ /boundary=(.*)/;

	$falttyp = "ingen";

	# Läs varje rad av data
	while ($rad = <STDIN>)
	{
		# Om vi förväntar oss att läsa ett dokumenthuvud
		if ($falttyp eq "huvud")
		{
			# Om vi stöter på en tom rad, avsluta läsningen av
			# huvudet och börja läsa fältinnehållet
			if ($rad eq "\r\n")
				{$falttyp = $nasta_falttyp}

			# Matcha filfälthuvuden
			elsif ($rad =~ m{^Content-Disposition:\ ?form-
				data;\ ?name="(.*?)";\ ?filename="(.*?)"}ix)
			{
				# Sätt $index till fältnamnet
				$index = $1;
				$form{$index} = "";

				# Filnamnet
				$fil_namn = $2;

				# Spara sökvägen
				$form{$index, "sokvag"} = $3;

				# Spara filnamnet som den räcka av tecken som
				# följer det sista / \ eller : i strängen.
				# (Inte nödvändigtvis korrekt, men en hygglig
				# gissning.)
				($form{$index, "filnamn"}) =
					$3 =~ m{([^/\\:]*)$};

				# Skapa en temporär fil och se till att den
				# inte redan existerar.
```

```
                do {$temp_fil = "/tmp/$$-".int(rand 1000000)}
                        while (-e $temp_fil);

                # Öppna den temporära filen.
                open (TEMP_FIL, ">$temp_fil")
                        or die "open: $!";

                # Lagra sökvägen till filen som en post i
                # %form.

                $form{$index} = $temp_fil;

                # Efter huvudet läser vi filinnehållet
                $nasta_falttyp = "fil";
        }

        # Matcha vanliga formulärfälthuvuden
        elsif ($rad =~ m{^Content-Disposition:\ ?form-
                data;\ ?name="(.*?)"}ix)
        {
                # Sätt $index till fältnamnet
                $index = $1; $form{$index} = "";

                # Efter huvudet läser vi fältet
                $nasta_falttyp = 'fält';
        }

        # Matcha Content-Type-huvud och  spara värdet
        elsif ($rad =~ /^Content-Type: ?(.*)\r\n/i)
                {$form{$index, "Content-Type"} = $1;}
}

# Om datat var en gränssträng
elsif ($rad =~ /^--$grans(--)?\r\n/)
{
        # Avsluta inmatningen av föregående fält
        if ($falttyp eq "fil")
        {
                # Om föregående fält var ett filfält, trunkera
                # två tecken från filen (för att ta bort \r\n)
                close TEMP_FIL;
                truncate $form{'fil'}, (-s $form{'fil'})-2;
        }
        # Trunkera avslutande \r\n från formulärfält
        elsif ($falttyp eq "fält")
                {$form{$index} =~ s/\r\n$//;}

        # Avsluta inläsningen om slutmarkören nås.
        last if $rad eq "--$grans--\r\n";

        # Sätt fälttyp till huvud eftersom det nästa vi
        # förväntar att läsa oss är ett dokumenthuvud.
        $falttyp = 'huvud';
}

# Vanliga rader (de som inte är gränssträngar eller
# huvuden) behandlas här
elsif ($falttyp eq "fil")
        {print TEMP_FIL $rad;}
```

```
		elsif ($falttyp eq "fält")
				{$form{$index}.=$rad;}
	}
}

#****************** Sub slumpsträng ***
sub slumpstrang
{
	my ($typ, $langd) = @_;
	my ($strang, $i, $tecken) = ("");

	# Loopa för varje tecken i strängen
	for ($i=0; $i<$langd; $i++)
	{
		# Om typen är"numerisk" generera ett tal
		# mellan 0-9
		if ($typ eq 'numerisk')
			{$tecken = int(rand(10)) + ord('0');}
		# Om typen är "alfabetisk" generera ett tecken
		# ur något av intervallen 0-9, a-z, A-Z
		elsif ($typ eq 'alfabetisk')
		{
			$tecken = int(rand(62)) + ord('0');
			$tecken += ord('A') - ord('9') - 1
				if $tecken>ord('9');
			$tecken += ord('a') - ord('Z') - 1
				if $tecken>ord('Z');
		}
		# Annars - generera ett godtyckligt tecken
		else
			{$tecken = int(rand(256));}

		# Lägg tecknet till strängen
		$strang .= chr($tecken);
	}
	$strang;
}

#****************** Sub lagra_attachment ***********
sub lagra_attachment
{
#************ Tar fram högsta nummer bland filer ***
$filkod_query = "select max(filkod) from forum_attach";
$sth2 = $dbh2->prepare($filkod_query);
$rader2 = $sth2->execute;
@count2 = $sth2->fetchrow_array;
$filkod = $count2[0]+1;

#*********** Spara ner filen i databasen ************
$rv2 = $dbh2->do("insert into forum_attach values
	 ($filkod,'$fil_namn','$filkatalog','$slump_namn', $kod);");
if ($rv2 == 1)
{
 print "<BR><H2><CENTER>Attachment sparat.<BR></H2>";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej (attach), var god f&ouml;rs&ouml;k
senare!<BR></H2>";
```

```
}
}

#****************** Sub felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}

sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'","/");
     my @mac    =
("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;","&acute\;","&#47
\;");
     my $i,$x;

for($i=0;$i<=$#matcha;$i++)
  {
   $form{"$matcha[$i]"} =~ s/\\/&#92\;/gs;
   for($x=0;$x<=$#tkn;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;
    }
  }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    skapa_prem.cgi
# Date:       9/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             This script stores the subscribers email and the ideacode related
#             to the idea the user subscribe to.
#
# CGI-variables:
#             email, num (projektkod), chkbox (vilka ideer skall prenumereras)
#
# Stored in DB:
#             email, ide, proj_kod
#
##############################################################################

#****************** Filnamn ***
$pren = "pren_ok.html";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub fixa_datum;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;

#***** Skriv ut toppen av html-sidan ***
print <<_HEAD_;
Content-Type: text/html\nPragma: no-cache

<html>
<head>
<title>Prenumeration</title>
</head>
<form action="$pren">
<body background=bilder/bkgrnd2.gif alink=teal link=silver vlink=teal>
<form>
_HEAD_


#************ Tar bort alla med rätt email från forum_prem ***
$prem_query = "delete from forum_prem where email='$form{email}' and proj_kod =
$form{num}";
$sth = $dbh->prepare($prem_query);
$rader = $sth->execute;
#************
@chkbox = split " ", $form{chkbox};

#*********** Spara nya prenumerationer i databasen ************
$prem_query = "select max(ide) from forum_prem";
$sth = $dbh2->prepare($prem_query);
```

```
$rader = $sth->execute;

$rv=1;
foreach $rad (@chkbox)
{
       $rv = $dbh2->do("insert into forum_prem values
         (1,'$form{email}',$rad,$form{num});");
}
if ($rv == 1)
{
 print "<BR><BR><BR><BR><BR><BR><H2><CENTER>Uppdateringen
utf&ouml;rd<BR></H2>";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej!!, var god f&ouml;rs&ouml;k
senare!<BR></H2>";
}

print <<_TOP_;
<CENTER><input type=submit value=Stäng onclick=self.close()><BR>
_TOP_

print <<_BOTTOM_;
</form>
</body>
</html>
_BOTTOM_

#****** Stäng databaskopplingarna
$dbh -> disconnect;
$dbh2 -> disconnect;

#****************** Subrutiner ***
#****************** Sub fixa_datum ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5  $4";
  return $datum;
}

#****************** Sub tolka_formular ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
```

```
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    skapa_svar.cgi
# Date:       16/6-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Creates a record into the forum_svar table, based on the
#             information given in the input-form.
#
# CGI-variables:
#             ide_kod, signatur, email, meddelande, fil
#
# Stored in DB:
#             kod, signatur, Date, meddelande, email, filkod, filnamn, path
#
##############################################################################

#****************** Filnamn ***
$frame = "../script/frame.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_multipart;
sub slumpstrang;
sub ladda_upp_fil;
sub lagra_attachment;
sub felkontroll;
sub send_mail;
sub koda_till_mac;
sub koda_till_email;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$ENV{'PATH'} = '/bin:/usr/bin:/usr/local/bin';  #** extra säkerhet mht sendmail
***
$filkatalog = "filer";
$datum = `date`;
$webadress = "w3.informatik.gu.se/~dss98f-2/dss2/";

#****************** Huvudprogram ***
srand;
tolka_multipart;

print "Content-Type: text/html\n\n";
print "<body background=bilder/bkgrnd2.gif >";

#***** Felkontroller ***
if ($form{'ide_kod'} eq "")      {felkontroll "titel";}
if ($form{'meddelande'} eq "") {felkontroll "meddelande";}
if ($form{'email'} =~ m/@.+\.\w{2,3}$/ || $form{'email'} eq ""){$check = "ok";}
else {felkontroll "epost";}

if ($form{'signatur'} eq "") {$form{'signatur'} = "Anonym";}
if ($form{'email'} eq "") {$form{'email'} = "null";}
#***********************
```

```
#***** Koda om å,ä och ö ***
koda_till_mac ("meddelande","signatur");
$form{"meddelande"} =~ s/\n/<BR>/gs;  #** Radmatningar till html

#*** Bryt ut filnamnet från sökvägen.
#*** Och ladda upp fil om det finns någon.
$fil_namn =~ m/([^\/\\:]*)$/;
$fil_namn = $1;
$fil_lst = `ls -l $form{'filnamn'}`;
$fil_lst =~ m/www\s+(\d+)/;
$storlek = $1;

if ($storlek>3){  #*** fanns det en fil, i så fall spara den ***
   ladda_upp_fil;
   lagra_attachment;
}else {$filkod = "null";}

# Skriv ut listan.
print <<_FOT_;

<BR>   Ide_kod: $form{'ide_kod'}
<BR>   Bamn: $form{'signatur'}
<BR>   Email: $form{'email'}
<BR>   Text: $form{'meddelande'}
<BR>   Filnamn: $fil_namn
<BR>   Storlek: $storlek bytes
<BR>   Datum: $datum
<BR>   End: $end
_FOT_

#************ Tar fram högsta nummer bland svaren ***
$kod_query = "select max(kod) from forum_svar";
$sth = $dbh->prepare($kod_query);
$rader = $sth->execute;
@count = $sth->fetchrow_array;
$kod = $count[0]+1;

#************ Tar fram projektkoden till detta svar samt titeln på iden ***
$proj_kod_query = "select proj_kod,titel from forum_ide where
kod=$form{'ide_kod'}";
$sth = $dbh->prepare($proj_kod_query);
$rader0  = $sth->execute;
@count0 = $sth->fetchrow_array;
$proj_kod = $count0[0];
$ide_titel = $count0[1];

#************ Hämtar emailadress till skaparen av idén ***
$mail_query = "select email from forum_ide where kod = $form{'ide_kod'}";
$sth = $dbh->prepare($mail_query);
$rader1 = $sth->execute;
@mail   = $sth->fetchrow_array;
$skapare_adress = $mail[0];

#************ Hämtar prenumeranters email ***
$pren_mail_query = "select email from forum_prem where ide = $form{ide_kod}";
$sth = $dbh->prepare($pren_mail_query);
$pren_rader = $sth->execute;
$pren_adress = "";
for ($i = 0; $i < $pren_rader; $i++)
```

```
{
 @pren_email  = $sth->fetchrow_array;
 $pren_adress = $pren_adress.$pren_email[0].",";
}

#************ Hämtar projekt-titeln ***
$proj_titel_query = "select titel from proj where proj_kod = $proj_kod";
$sth = $dbh->prepare($proj_titel_query);
$rader_proj_titel = $sth->execute;
@proj_titel_q   = $sth->fetchrow_array;
$proj_titel = $proj_titel_q[0];

#*********** Spara ny ide i databasen ************
$rv = $dbh->do("insert into forum_svar
             (kod,ide_kod,signatur,datum,meddelande,email,filkod,proj_kod)
             values
              ($kod, $form{'ide_kod'},'$form{'signatur'}',
              '$datum','$form{'meddelande'}','$form{'email'}',
               $filkod, $proj_kod);");
if ($rv == 1)
{
 print "<BR><H2><CENTER>Uppdateringen utf&ouml;rd<BR></H2><BR>\<a
href=\"$frame?funktion=forum&num=$proj_kod\" target=right><< Åter till
forum</a>";



 #***** Koda om å,ä och ö ***
 koda_till_email ($proj_titel,$ide_titel);

 #***** Här sker utskick av mail till skapare och prenumeranter **
 if($skapare_adress)
 {
   send_mail ($skapare_adress, $proj_titel ,$ide_titel, skapare);
 }
 if($pren_adress)
 {
 send_mail ($pren_adress, $proj_titel ,$ide_titel, prenumerant);
 }
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej!!, var god f&ouml;rs&ouml;k
senare!<BR></H2>";
}
#*** Stäng databaskopplingarna ***
$dbh  -> disconnect;
$dbh2 -> disconnect;

#********** Subrutiner *************
#********** Sub Ladda fil **********

sub ladda_upp_fil
{
       my ($faktiskt_namn, $K, $rad, $andelse);

       # Ge filen ett slumpmässigt namn
       do {$faktiskt_namn = int(rand 100000).".asis";}
              while -e "$filkatalog/$faktiskt_namn";
```

```
	$faktiskt_namn = "$fil_namn"._."$faktiskt_namn";
	$slump_namn = $faktiskt_namn;
	# Om ingen Content-Type har angetts, försök bestämma den
	# genom att titta på filändelsen.
	if (!$form{'fil','Content-Type'})
	{

		# Detta är den default Content-Type som används om
		# ingen lämplig hittas
		$form{'fil','Content-Type'} = 'application/x-unknown';

#		# Finn ändelsen
#		($andelse) = $form{'fil','filnamn'} =~ /\.([^.]*)$/;
#
#		# Matcha ändelsen mot raderna i filen mime.types
#
#		open (MIME, "<mime.types") or die (print "kan ej öppna open: $!");
#		while ($rad = <MIME>)
#		{
#			if ($rad =~ /^(.*?)\s.*\b$andelse\b/)
#				{$form{'fil','Content-Type'} = $1;}
#		}
#		close MIME;
	}

	# Skriv ut en lämplig header till ASIS-filen
	open (ASIS, ">$filkatalog/$faktiskt_namn")
		or die "open: $!";
	print ASIS <<_HUVUD_;
Status: 200 OK
Content-Type: $form{'fil','Content-Type'}

_HUVUD_
	# Lägg till den temporära filens innehåll

	open (TEMP, "<$form{'filnamn'}") or die (print "kan ej öppna!!<P>");
	print ASIS $rad while $rad = <TEMP>;
	close TEMP;
	 close ASIS;

	# Radera den temporära filen, vi behöver den inte mer
	unlink "$form{'filnamn'}";

	# Radera HTML-markörer från beskrivningen och det
	# önskade filnamnet.
	foreach $_ ($form{'beskrivning'}, $form{'filnamn'})
		{$_ =~ s/([<>])/$1 eq "<" ? "&lt;" : "&gt;"/ge}

	# Beräkna filstorleken i K
	$K = 1+int((-s "$filkatalog/$faktiskt_namn")/1024);

}

#********** Sub tolka multipart formulär *********
sub tolka_multipart
{
	# Om innehållstypen inte är multipart/form-data, anropa
	# den gamla tolka_formular-rutinen.
```

```
if ($ENV{'CONTENT_TYPE'} !~ /^multipart\/form-data/)
{
	tolka_formular;
	return;
}

my ($grans, $rad, $temp_fil, $index, $falttyp,
	$nasta_falttyp);

# Extrahera gränssträngen
($grans) = $ENV{'CONTENT_TYPE'} =~ /boundary=(.*)/;

$falttyp = "ingen";

# Läs varje rad av data
while ($rad = <STDIN>)
{
	# Om vi förväntar oss att läsa ett dokumenthuvud
	if ($falttyp eq "huvud")
	{
		# Om vi stöter på en tom rad, avsluta läsningen av
		# huvudet och börja läsa fältinnehållet
		if ($rad eq "\r\n")
			{$falttyp = $nasta_falttyp}

		# Matcha filfälthuvuden
		elsif ($rad =~ m{^Content-Disposition:\ ?form-
			data;\ ?name="(.*?)";\ ?filename="(.*?)"}ix)
		{
			# Sätt $index till fältnamnet
			$index = $1;
			$form{$index} = "";

			# Filnamnet
			$fil_namn = $2;

			# Spara sökvägen
			$form{$index, "sokvag"} = $3;

			# Spara filnamnet som den räcka av tecken som
			# följer det sista / \ eller : i strängen.
			# (Inte nödvändigtvis korrekt, men en hygglig
			# gissning.)
			($form{$index, "filnamn"}) =
				$3 =~ m{([^/\\:]*)$};

			# Skapa en temporär fil och se till att den
			# inte redan existerar.
			do {$temp_fil = "/tmp/$$-".int(rand 1000000)}
				while (-e $temp_fil);

			# Öppna den temporära filen.
			open (TEMP_FIL, ">$temp_fil")
				or die "open: $!";

			# Lagra sökvägen till filen som en post i
			# %form.

			$form{$index} = $temp_fil;
```

```
                        # Efter huvudet läser vi filinnehållet
                        $nasta_falttyp = "fil";
                }

                # Matcha vanliga formulärfälthuvuden
                elsif ($rad =~ m{^Content-Disposition:\ ?form-
                        data;\ ?name="(.*?)"}ix)
                {
                        # Sätt $index till fältnamnet
                        $index = $1; $form{$index} = "";

                        # Efter huvudet läser vi fältet
                        $nasta_falttyp = 'fält';
                }

                # Matcha Content-Type-huvud och  spara värdet
                elsif ($rad =~ /^Content-Type: ?(.*)\r\n/i)
                        {$form{$index, "Content-Type"} = $1;}
        }

        # Om datat var en gränssträng
        elsif ($rad =~ /^--$grans(--)?\r\n/)
        {
                # Avsluta inmatningen av föregående fält
                if ($falttyp eq "fil")
                {
                        # Om föregående fält var ett filfält, trunkera
                        # två tecken från filen (för att ta bort \r\n)
                        close TEMP_FIL;
                        truncate $form{'fil'}, (-s $form{'fil'})-2;
                }
                # Trunkera avslutande \r\n från formulärfält
                elsif ($falttyp eq "fält")
                        {$form{$index} =~ s/\r\n$//;}

                # Avsluta inläsningen om slutmarkören nås.
                last if $rad eq "--$grans--\r\n";

                # Sätt fälttyp till huvud eftersom det nästa vi
                # förväntar att läsa oss är ett dokumenthuvud.
                $falttyp = 'huvud';
        }

        # Vanliga rader (de som inte är gränssträngar eller
        # huvuden) behandlas här
        elsif ($falttyp eq "fil")
                {print TEMP_FIL $rad;}
        elsif ($falttyp eq "fält")
                        {$form{$index}.=$rad;}
    }
}

#******** Sub slumpsträng ***********
sub slumpstrang
{
    my ($typ, $langd) = @_;
    my ($strang, $i, $tecken) = ("");
```

```
	# Loopa för varje tecken i strängen
	for ($i=0; $i<$langd; $i++)
	{
		# Om typen är"numerisk" generera ett tal
		# mellan 0-9
		if ($typ eq 'numerisk')
			{$tecken = int(rand(10)) + ord('0');}
		# Om typen är "alfabetisk" generera ett tecken
		# ur något av intervallen 0-9, a-z, A-Z
		elsif ($typ eq 'alfabetisk')
		{
			$tecken = int(rand(62)) + ord('0');
			$tecken += ord('A') - ord('9') - 1
				if $tecken>ord('9');
			$tecken += ord('a') - ord('Z') - 1
				if $tecken>ord('Z');
		}
		# Annars - generera ett godtyckligt tecken
		else
			{$tecken = int(rand(256));}

		# Lägg tecknet till strängen
		$strang .= chr($tecken);
	}
	$strang;
}

#******** Sub lagra_attachment ***********
sub lagra_attachment
{
#************ Tar fram högsta nummer bland filer ***
$filkod_query = "select max(filkod) from forum_attach";
$sth2 = $dbh2->prepare($filkod_query);
$rader2 = $sth2->execute;
@count2 = $sth2->fetchrow_array;
$filkod = $count2[0]+1;
#*********** Spara ny ide i databasen ************
$rv2 = $dbh2->do("insert into forum_attach values
              ($filkod,'$fil_namn','$filkatalog','$slump_namn',
$form{'ide_kod'});");
if ($rv2 == 1)
{
 print "<BR><H2><CENTER>Attachment sparat.<BR></H2>";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej (attach), var god f&ouml;rs&ouml;k
senare!<BR></H2>";
}
}

#***** Sub felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}
```

```
#********** Sub koda_till_mac **********
sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'","/");
     my @mac    =
("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;","&acute\;","&#47
\;");
     my $i,$x;

for($i=0;$i<=$#matcha;$i++)
  {
   $form{"$matcha[$i]"} =~ s/\\/&#92\;/gs;
   for($x=0;$x<=$#tkn;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;
    }
  }
}

#********** Sub koda_till_email **********
sub koda_till_email
{
      @matcha2 = @_;
      my @tkn2    =
("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;");
      my @mac2    = ("å","Å","ä","Ä","ö","Ö");
      my $i,$x;

for($i=0;$i<=$#matcha2;$i++)
  {
   for($x=0;$x<=$#tkn2;$x++)
    {
    $proj_titel =~ s/$tkn2[$x]/$mac2[$x]/gs;
    $ide_titel  =~ s/$tkn2[$x]/$mac2[$x]/gs;
    }
  }
}



#********** Sub send_email **********
sub send_mail
{
my ($to, $proj, $ide_titel, $typ) = @_;

if($typ eq "skapare"){$typ = "Nytt svar i dss-forumet";}
else {$typ = "Nytt inlägg i dss-forumet";}

open (BREV, "|/usr/lib/sendmail -t -oi") or die ("Kan inte hitta sendmail:
$!");
print BREV <<_STOP_;
Mime-Version: 1.0
Content-Type: text/plain; charset=iso-8859-1
Content-Transfer-Encoding: quoted-printable
To: $to
From: DSS-Forum
Cc:
```

```
Subject: $typ

Ett nytt inlägg har skett i forumet
Projekt: $proj
Titel: $ide_titel

web-adress: http://$webadress


(Automatiskt brevutskick från dss-systemet.)

_STOP_

close BREV;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   Spara_user_reg.cgi
# Date:            7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Creates a record into user_table with the basic information about
#            the user, and sends automatically a message to the administrator
#            with the password information that the user requested.
#
# CGI-variables:
#            titel, namn, email, meddelande, keys, fil, proj_kod
#
# Stored in DB:
#            kod, titel, signatur, Date, meddelande, email, nyckelord, filkod,
#            filnamn, path, proj_kod
#
##############################################################################

#********* Initiera subrutiner och variabler **
sub tolka_formular;
sub koda_till_mac;
sub koda_till_email;
sub felkontroll;
sub send_mail;
use DBI;
tolka_formular;

$dbh3  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

$admin_email = "dss98f-2\@student.informatik.gu.se";
$salt =chr(ord('a')+rand(26)).chr(ord('a')+rand(26));

print "Content-Type: text/html\n\n";
print"<body background=bilder/bkgrnd2.gif><br>";

koda_till_mac ("namn");

$env_adr = "$ENV{'REMOTE_ADDR'} \n $ENV{'HTTP_USER_AGENT'} \n
$ENV{'REMOTE_HOST'} ";

if ($form{'email'} =~ m/@.+\.\w{2,3}$/ || $form{'email'} eq "" ){$check =
"ok";}
else {felkontroll "epost";}
if ($form{'password'} ne $form{'verifiering'}) {felkontroll "lösenordet det
matchar inte
 verifieringen";}
$form{'password'} = crypt $form{'password'}, $salt;

#********* Huvud program ***********
$datum = localtime;
$userid = $form{kod};

#************** Hämtar sista projektkoden ********************
$user_query = "select max(kod) from user_table";
```

```
$sth = $dbh3->prepare($user_query);
$rader = $sth->execute;
@count = $sth->fetchrow_array;
$userid = $count[0]+1;
$dbh3->disconnect;
$dbh3  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#************** Hämtar sista projektkoden *******************
$user_query = "select * from user_table where email = '$form{email}'";
$sth = $dbh3->prepare($user_query);
$rader = $sth->execute;
for ($i = 0; $i < $rader; $i++)
{
 @email = $sth->fetchrow_array;
 if ($i > 0) {$existerande = "Användarens email existerar redan i systemet";}
}
$dbh3  -> disconnect;
print"ID: $userid<br>";
print"Namn: $form{namn}<br>";
print"Tel: $form{tel}<br>";
print"Mobil: $form{mobil}<br>";
print"Sök: $form{sok}<br>";
print"Email: $form{email}<br>";

#************Lagrar projektinformatioinen i
User_tabel**************************
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#*********** Spara ny ide i databasen ************
$rv = $dbh->do("INSERT INTO user_table VALUES
($userid, '$form{namn}', '$form{tel}' , '$form{mobil}', '$form{sok}',
'$form{email}','','f','')");

if ($rv == 1)
{
 print "<BR><H2><CENTER>Uppdateringen utf&ouml;rd av användartabell<BR></H2>";
 print"$form{titel}";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej för användartabell !!, var god
 f&ouml;rs&ouml;k senare!<BR></H2>";
}
$dbh  -> disconnect;

#***** Koda om å,ä och ö ***
koda_till_email ($form{namn},$existerande);

send_mail ($admin_email, $form{namn}, $form{email}, $form{tel}, $form{mobil},
$form{sok}, $form{kod}, $env_adr, $form{password}, $existerande);

print"<center><a href=blank.html> [Tillbaka]</a>";
#**********************************subrutiner*******************************
**

sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
```

```
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}


#********** Sub koda_till_mac **********
sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'","/");
     my @mac    =
("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;",
      "&acute\;","&#47\;");
     my $i,$x;

for($i=0;$i<=$#matcha;$i++)
  {
   $form{"$matcha[$i]"} =~ s/\\/&#92\;/gs;
   for($x=0;$x<=$#tkn;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;
    }
  }
}

#***** Sub felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}

#********** Sub send_email **********
sub send_mail
{
my ($to, $namn, $email, $tel, $mobil, $sok, $id, $envinfo, $passw, $info) = @_;

open (BREV, "|/usr/lib/sendmail -t -oi") or die ("Kan inte hitta sendmail:
$!");
```

```
print BREV <<_STOP_;
Mime-Version: 1.0
Content-Type: text/plain; charset=iso-8859-1
Content-Transfer-Encoding: quoted-printable
To: $to
From: $email
Cc:
Subject: Nyregistrering

Följande person vill registrera sig:

ID: $id
Namn: $namn
Email: $email
Lösenord: $passw

Tel: $tel
Mobil: $mobil
Sök: $sok
Övrig info: $info


ENV:
$envinfo

(Automatiskt utskick från dss-systemet.)
_STOP_
close BREV;
}

#********** Sub koda_till_email **********
sub koda_till_email
{
      @matcha2 = @_;
      my @tkn2    =
("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;");
      my @mac2    = ("å","Å","ä","Ä","ö","Ö");
      my $i,$x;

 for($i=0;$i<=$#matcha2;$i++)
   {
    for($x=0;$x<=$#tkn2;$x++)
     {
     $form{namn} =~ s/$tkn2[$x]/$mac2[$x]/gs;
     $existerande  =~ s/$tkn2[$x]/$mac2[$x]/gs;
     }
   }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   user_reg.cgi
# Date:      7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out a input-form in order to let the user register
#            him/herself in order to open an account to the system.
#
##############################################################################

#** Filnamn och variabler **
use DBI;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$agendaprg = "";

#****************** huvudprogram ***
#************ Hämtar true or false från user_proj ***
$meddelande_query = "select * from user_table where kod = $form{kod}'";
$sth = $dbh->prepare($meddelande_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
 @anv = $sth->fetchrow_array;
}
if ($anv[7] eq 'true')
{
 $chkbox = 'checked';
}
else
{
 $chkbox = '';
}

#******** Skriv ut ändrings formuläret *****************
print "Content-Type: text/html\n\n";
print"<body background=bilder/bkgrnd2.gif>";
tolka_formular;

print"<center><a href=blank.html> [Tillbaka]</a>";
print <<_HTML_;
<FORM ACTION="spara_user_reg.cgi" METHOD="POST">
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bilder/bkgrnd2.gif" nowrap>
<tr>
<td>
<table border="0" align="left" cellspacing="0" cellpadding="0"  valign="top"
width=601 background="bilder/bkgrnd2.gif">
       <tr>
```

```
<td width="12" height="25" align="left" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" height="35" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<font face=helvetica size=4 face=Arial color=silver><center><b>Välkommen
!</b></center><br></font>
<font face=helvetica size=2 face=helvetica color=silver>För att systemet
skall bli så enkelt att använda som möjligt ber vi dig här fylla i din
personuppgifter och spara detta genom att klicka på Skicka-knappen. Dina
uppgifter skickas sedan till systemets administratör som lägger upp dig
som användare
<br><br>
Så snart detta är gjort får du en bekräftelse och kan logga in med din
emailadress som användarnamn och ditt angivna lösenord. </font>
<hr></td>
<td width="12" align="right" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<table border="0" align="left" cellspacing="0" cellpadding="8"
valign="top" background="bilder/bkgrnd2.gif">
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_1.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<INPUT TYPE=text NAME="namn" VALUE="" SIZE="44">
</td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_2.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
<INPUT TYPE=text NAME="tel" VALUE=""
SIZE="15">        
<img src="bilder/form_anv_3.gif" width=47 height=30 hspace=0 vspace=0
border=0 alt="">
<INPUT TYPE=text NAME="mobil" VALUE="" SIZE="15">
</td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_4.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
<INPUT TYPE=text NAME="sok" VALUE=""
SIZE="15">        
```

```
      <img src="bilder/form_anv_5.gif" width=47 height=30 hspace=0 vspace=0
      border=0 alt="">
      <INPUT TYPE=text NAME="email" VALUE="" SIZE="32">
      </td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      </tr>
_HTML_
print <<_HTML_;
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>
      Önskat
      lösenord:          
                
         
           Verifiera Lösenord:<br></font>
      <INPUT TYPE=password NAME="password" VALUE="" SIZE="20">
             
        
      <INPUT TYPE=password NAME="verifiering" VALUE="" SIZE="20">
      </td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif">
      </td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><input  type=submit value="Skicka"></td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      </tr>
      </table>
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      </table>
</td>
</tr>
</table>
</form>
_HTML_
```

```
print <<_HTML_;
</body>
</html>
_HTML_
$dbh -> disconnect;
$dbh2 -> disconnect;
$dbh3 -> disconnect;

#*********************SUBRUTINER***********************'
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}
#***** Felkontroll ***
sub felkontroll
{
  my $typ = $_[0];
  print "Din inmatning är ej korrekt, var god ändra $typ!";
  die;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    frame.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             This script directs the requested site to the correct frame. This
#             program identifies which Frame-variable is set and directs the
#             page to the correct destination. Most often this variable is set
#             to top or middle frame.
#
#
# CGI-variables:
#             num, funktion, proj, sida, ide, day, month, year, nyckelord
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use LWP::Simple;
sub tolka_formular;

#** Filnamn **
#triggers till beslutsbanken
$beslut_adress   = "http://system:gborgborgo\@w3.informatik.gu.se/
      ~dss98f-2/dss2/beslutsbank/skapa_beslut_fil.cgi";
$top_prg         = "top.cgi";                  #*** Program för top-framen  **
$agenda_prg      = "../agenda/agenda.cgi";     #*** Program för agendan     **
$forum_prg       = "../forum/list.cgi?num=";   #*** Program för forum       **
$beslut_prg      = "../beslutsbank/beslutstrad.html"; #** Prog för beslutbnk **
$beslutskort_prg = "../admin/list_admin.cgi?num="; #*** Prog för admin       **
$admin_user      = "../admin/user.cgi";         #*** Program för admin_user  **
$dagordning_prg  = "dagordning/dagordning.html";#*** Program för dagordning  **
$blank           = "../blank.html";             #*** Blank sida              **
$left            = "left.html";                 #*** Vänstersidan            **
$bottom          = "bottom.html";               #*** Nedre frame             **

#****************** Huvudprogram ***

tolka_formular;
$num = $form{num};                       #*** Variabel som talat om vilket
projekt ***

print "Content-Type: text/html\n\n";

if ($form{funktion} eq 'agenda')
{
print<<_AGENDA_;
      <frameset  rows=\"105,*\" border=0 frameborder=0>
      <frame name=\"head\" src=\"$top_prg?funktion=agenda\" marginwidth=\"1\"
      marginheight=\"1\" scrolling=\"no\" >
      <frame name=\"main\" src=\"$agenda_prg?mem=0&proj=$form{'proj'}\"
      marginwidth=\"10\" marginheight=\"10\" scrolling=\"auto\" >
      </frameset>
_AGENDA_
}
```

```
elsif ($form{funktion} eq 'forum')
{
print<<_FORUM_;
       <frameset  rows=\"105,*\" border=0 frameborder=0>
       <frame name=\"head\" src=\"$top_prg?funktion=forum&num=$num\"
       marginwidth=\"1\" marginheight=\"1\" scrolling=\"no\" >
       <frame name=\"main\" src=\"$forum_prg$num\" marginwidth=\"10\"
       marginheight=\"10\" scrolling=\"auto\" >
       </frameset>

_FORUM_
}

elsif ($form{funktion} eq 'forum_blank')
{
print<<_FORUM_;
       <frameset  rows=\"105,*\" border=0 frameborder=0>
       <frame name=\"head\" src=\"$top_prg?funktion=forum\" marginwidth=\"1\"
       marginheight=\"1\" scrolling=\"no\" >
       <frame name=\"main\" src=\"$blank\" marginwidth=\"10\"
       marginheight=\"10\" scrolling=\"auto\" >
       </frameset>
_FORUM_
}

elsif ($form{funktion} eq 'forum_disk')
{
print<<_FORUM_DISK_;
       <!-- $form{sida} -->
       <frameset  rows=\"105,*\" border=0 frameborder=0>
       <frame name=\"head\" src=\"$top_prg?funktion=forum_disk&ide=$form{ide}\"
       marginwidth=\"1\" marginheight=\"1\" scrolling=\"no\" >
       <frame name=\"main\" src=\"../forum/$form{sida}&ide=$form{ide}\"
       marginwidth=\"10\" marginheight=\"10\" scrolling=\"auto\" >
       </frameset>
_FORUM_DISK_
}

elsif ($form{funktion} eq 'forum_popup')
{
print<<_FORUM_POPUP_;
       <frameset  rows="70%,*" >
       <frame name="top" src="../forum/beslutskort.html" marginwidth="1"
       marginheight="1" scrolling="auto" bordercolor="silver" frameborder="yes">
       <frame name="center" src="../forum/list_sokresultat.cgi?ide=$form{ide}"
       marginwidth="10" marginheight="10" scrolling="auto" bordercolor="blue"
       frameborder="yes" >
       </frameset>
_FORUM_POPUP_
}

elsif ($form{funktion} eq 'beslutsbank')
{
$getpage = get $beslut_adress;
print<<_BESLUT_;
       <frameset  rows=\"105,*\" border=0 frameborder=0>
       <frame name=\"head\" src=\"$top_prg?funktion=beslutsbank\"
       marginwidth=\"1\" marginheight=\"1\" scrolling=\"no\" >
```

```
      <frame name=\"main\" src=\"$beslut_prg\" marginwidth=\"10\"
      marginheight=\"10\" scrolling=\"auto\" >
      </frameset>
_BESLUT_
}

elsif ($form{funktion} eq 'beslutsbank_popup')
{
print<<_BESLUTSBANK_POPUP_;
      <frameset  rows="70%,*" >
       <frame name="top" src="../forum/beslutskort.html" marginwidth="1"
      marginheight="1" scrolling="auto" bordercolor="silver" frameborder="yes">
       <frame name="center"
      src="../beslutsbanken/sok.cgi?nyckelord=$form{nyckelord}&day=$form{day}&d
      ay=$form{year}day=$form{month}" marginwidth="10" marginheight="10"
      scrolling="auto" bordercolor="blue" frameborder="yes" >
      </frameset>
_BESLUTSBANK_POPUP_
}

elsif ($form{funktion} eq 'admin')
{
print<<_BESLUT_;
      <frameset  rows=\"105,*\" border=0 frameborder=0>
      <frame name=\"head\" src=\"$top_prg?funktion=admin\" marginwidth=\"1\"
      marginheight=\"1\" scrolling=\"no\" >
      <frame name=\"main\" src=\"$beslutskort_prg$num\" marginwidth=\"10\"
      marginheight=\"10\" scrolling=\"auto\" >
      </frameset>
_BESLUT_
}

elsif ($form{funktion} eq 'admin_user')
{
print<<_BESLUT_;
      <frameset  rows=\"105,*\" border=0 frameborder=0>
      <frame name=\"head\" src=\"$top_prg?funktion=admin_user\"
      marginwidth=\"1\" marginheight=\"1\" scrolling=\"no\" >
      <frame name=\"main\" src=\"$admin_user\" marginwidth=\"10\"
      marginheight=\"10\" scrolling=\"auto\" >
      </frameset>
_BESLUT_
}

elsif ($form{funktion} eq 'dagordning')
{
print<<_DAGORDNING_;
      <frameset  rows=\"105,*\" border=0 frameborder=0>
      <frame name=\"head\" src=\"$top_prg?funktion=\" marginwidth=\"1\"
      marginheight=\"1\" scrolling=\"no\" >
      <frame name=\"main\" src=\"$dagordning_prg\" marginwidth=\"10\"
      marginheight=\"10\" scrolling=\"auto\" >
      </frameset>
_DAGORDNING_
}

else
{
print<<_EMPTY_;
```

```
      <frameset rows=\"10%,*\" border=0 frameborder=0 >
      <frame name=\"head\" src=\"$blank\" marginwidth=\"0\" marginheight=\"0\"
      scrolling=\"no\" >
      <frame name=\"main\" src=\"$blank\" marginwidth=\"0\" marginheight=\"0\"
      scrolling=\"auto\" >
      </frameset>
_EMPTY_
}

#****************** Subrutiner ***
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
```

```
#!/usr/bin/perl

################################################################################
# Program:    top.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             This script creates different layouts in the Top-Frame, depending
#             on what the function-variable is set to, this in order to present
#             the correct layout of buttons and dropdowns.  The script also
#             seeks the database for active projects and lists them in a
#             dropdown-list,  this is only done when requests regarding projects
#             are done.
#
# CGI-variables:    num, funktion, ide
#
################################################################################

#********* Initiera subrutiner och variabler **
use DBI;
sub tolka_formular;

#********* Huvud program ***********
print "Content-Type: text/html\n\n";
tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$num2 = $form{num};
#********************************************* Printar top till agendan
************************************************

if ($form{funktion} eq 'agenda')
{
print<<_AGENDA_TOP_;
<html>
<head>
<title>Organizational decision support</title>
<script src="../agenda/aktiveringsscript.js">
</script>

<script language="JavaScript">
<!--
function go(e) {
if (e.options[e.selectedIndex].value != "") {
        parent.location.href = e.options[e.selectedIndex].value ;
}
e.selectedIndex = 0;
}
function divAktivering() {
parent.frames[0].location.href='blank.html';
}
// -->
</script>

</head>
<body background=../bilder/bkgrnd3.gif>
<form action=#>
```

```
<table border=0 align=left width=585 cellpadding=0>
       <tr>
       <td width=234 height=56 >  </td>
       <td width=234 >  </td>
       <td width=234 >  </td>
       </tr>
       <tr>
       <!-- Image tags modified by LiveImage for Client Side Image Map insertion
       -->
       <td align=center valign=center>
       <select name="projekt" onchange="go(this)">
       <option value="#">V&auml;lj Projekt !</option>
       <option value=
       "../script/frame.cgi?funktion=agenda&proj=0">Allmänt</option>
_AGENDA_TOP_

#************** Lägger in projekten i listan  *******************
$proj_query = "select * from proj";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
#************

for ($i = 0; $i < $rader; $i++)
{
@proj = $sth->fetchrow_array;
print"<option
value=\"../script/frame.cgi?funktion=agenda&proj=$proj[0]\">$proj[2]</option>";
}
$dbh  -> disconnect;

print<<_AGENDA_TOP_;
       </select>
       </td>
       <td align=left valign=bottom>
         <img src=../forum/bilder/button1.gif USEMAP=#button2
       width=341 height=32 hspace=0 vspace=0 border=0 align=middle >
       </td>
       </tr>
       </table>
       <!-- Start of Client Side Image Map information --><MAP NAME=button2>
       <!-- #$DATE:Tue Jun 15 10:24:50 1999 -->
       <!-- #$GIF:button2.gif -->
       <AREA SHAPE=RECT COORDS=2,0,78,30
       HREF="javascript:scriptAktivering('backAgenda()',1 )" TARGET=main ALT=>
       <AREA SHAPE=RECT COORDS=129,0,219,31 HREF="../agenda/edit.cgi"
       ALT="Editera agendan" TARGET=main>
       <AREA SHAPE=RECT COORDS=266,0,341,31
       HREF="javascript:scriptAktivering('forwardAgenda()',1 )" TARGET=main ALT=
       >
       </MAP>
       <!-- End of Client Side Image Map information --></body></html>
_AGENDA_TOP_

#********************************************** Printar top till Forum
**********************************************
}

elsif ($form{funktion} eq 'forum'){
print<<_FORUM_NYTT_INLAEGG_TOP_;
```

```
<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript"><!--
function go(e) {
if (e.options[e.selectedIndex].value != "") {
        parent.location.href = e.options[e.selectedIndex].value ;
}
e.selectedIndex = 0;
}
// --></script>
</head>
<body background=../bilder/bkgrnd3.gif>
<form action=#>
<table border=0 align=left cellpadding=0 width=585>
       <tr>
       <td width=234 height=56 >  </td>
       <td width=234 >  </td>
       <td width=234 >  </td>
       </tr>
       <tr>
       <td width=223 nowrap align=right valign=middle ><font face=helvetica
       size=2 color=silver>Projekt:</font></td>
       <td width=239 valign=middle>
       <select  name="projekt" onchange="go(this)">
       <option value="#">V&auml;lj Projekt !</option>
_FORUM_NYTT_INLAEGG_TOP_

#************** Lägger in projekten i listan  ********************
$proj_query = "select * from proj";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
#************

for ($i = 0; $i < $rader; $i++)
{
@proj = $sth->fetchrow_array;
print"<option
value=\"../script/frame.cgi?funktion=forum&num=$proj[0]\">$proj[2]</option>";
}
$dbh  -> disconnect;

print<<_FORUM_NYTT_INLAEGG_TOP_;
       </select>
       </td>
       <td align=left>
       <!-- Image tags modified by LiveImage for Client Side Image Map insertion
       -->
       <IMG SRC=../forum/bilder/button3.gif  USEMAP=#button3 BORDER=0 WIDTH=88
       HEIGHT=32 hspace=88 vspace=0 align=middle alt=></td>
       <td width=234 >  </td>
       </tr>
       </table>
       <!-- Start of Client Side Image Map information -->
       <MAP NAME=button3>
       <!-- #$DATE:Tue Jun 15 11:37:34 1999 --><!-- #$GIF:button3.gif -->
       <AREA SHAPE=RECT COORDS=1,0,87,31 HREF=../forum/ny_ide.cgi?num=$num2
       ALT=Klicka h&auml;r f&ouml;r att l&auml;gga till ny beslutsstr&ouml;m
       target=main>
```

```
      </MAP>
      <!-- End of Client Side Image Map information -->
      </form>
      </body></html>
_FORUM_NYTT_INLAEGG_TOP_

#********************************************** Printar top till
disskussionsforum ***********************************************
}

elsif($form{funktion} eq 'forum_disk')
{
print<<_FORUM_NYTT_INLAEGG_TOP_;
<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript"><!--
function go(e) {
if (e.options[e.selectedIndex].value != "") {
        parent.location.href = e.options[e.selectedIndex].value ;
}
e.selectedIndex = 0;
}
// --></script>
</head>
<body background=../bilder/bkgrnd3.gif>
<form action=#>
<table border=0 align=left cellpadding=1 width=585>
      <tr>
      <td width=234 height=54 >  </td>
      <td width=234 >  </td>
      <td width=234 >  </td>
      </tr>
      <tr>
      <td width=223 nowrap align=right valign=middle ><font face=helvetica
      size=2 color=silver>Projekt:</font></td>
      <td width=239 valign=middle>
      <select  name="projekt" onchange="go(this)">
      <option value="#">V&auml;lj Projekt !</option>
_FORUM_NYTT_INLAEGG_TOP_

#************** Lägger in projekten i listan  *******************
$proj_query = "select * from proj";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
#************

for ($i = 0; $i < $rader; $i++)
{
@proj = $sth->fetchrow_array;
print"<option
value=\"../script/frame.cgi?funktion=forum&num=$proj[0]\">$proj[2]</option>";
}
$dbh  -> disconnect;

print<<_FORUM_DISKUSSION_TOP_;
      </select>
      </td>
      </td>
```

```
       <td align=left>
       <a HREF=../forum/ny_svar.cgi?num=$form{ide} ALT=Besvara inl&auml;gg
       TARGET=main>
       <img src=../forum/bilder/button_svara.gif  hspace=0 vspace=0 border=0
       align=middle alt=>
       </a><td width=234 >  </td>
       </tr>
       </table>
_FORUM_DISKUSSION_TOP_

print<<_FORUM_DISKUSSION_TOP_;
       <!-- End of Client Side Image Map information -->
       </body>
       </html>
_FORUM_DISKUSSION_TOP_

#********************************************** Printar top till Admin
***********************************************
}

elsif ($form{funktion} eq 'admin'){
print<<_ADMIN_;
<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript"><!--
function go(e) {
if (e.options[e.selectedIndex].value != "") {
        parent.location.href = e.options[e.selectedIndex].value ;
}
e.selectedIndex = 0;
}
// --></script>
</head>
<body background="../bilder/bkgrnd3.gif" alink=silver link=silver vlink=silver
>
<form action=#>
<table border=0 align=left cellpadding=0 width=585>
       <tr>
       <td width=234 height=59 >  </td>
       <td width=234 >  </td>
       <td width=234 >  </td>
       </tr>
       <tr>
       <td width=223 nowrap align=right valign=middle ><font face=helvetica
       size=2 color=silver>Projekt:</td>
       <td width=239 valign=top>
       <select name="projekt" onchange="go(this)">
       <option value="#">V&auml;lj Projekt !</option>
_ADMIN_

#************** Lägger in projekten i listan  *******************
$proj_query = "select * from proj";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
#************

for ($i = 0; $i < $rader; $i++)
{
```

```
@proj = $sth->fetchrow_array;
print"<option
value=\"../script/frame.cgi?funktion=admin&num=$proj[0]\">$proj[2]</option>";
}
$dbh  -> disconnect;
print<<_ADMIN_;
       </select>
       </td>
       </td>
       <td align=left>
       </td>
       <td width=234 >  </td>
       </tr>
       </table>
       </form>
       </body></html>
_ADMIN_
}
#********************************************** Printar top till Admin_anv
***********************************************

elsif ($form{funktion} eq 'admin_user'){

print<<_ADMIN_START_;
<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript"><!--
function go(e) {
if (e.options[e.selectedIndex].value != "") {
        parent.location.href = e.options[e.selectedIndex].value ;
}
e.selectedIndex = 0;
}
// --></script>
</head>
<body background="../bilder/bkgrnd3.gif" alink=silver link=silver vlink=silver
>
<form action=#>
<table border=0 align=left cellpadding=3 width=585>
       <tr>
       <td width=223 nowrap align=right valign=bottom ><font face=helvetica
       size=2 color=silver>
       <a href=../script/frame.cgi?funktion=admin target=right >
       </a>
       </font></td>
       <td width=239 valign=bottom>
       </td>
       </td>
       <td align=left>
       </td>
       <td width=234 >  </td>
       <a href=../script/frame.cgi?funktion=blank target=right>
       </tr>
       </table>
       </form>
       </body></html>
_ADMIN_START_
}
```

```
#********************************************** Printar top till belutsbanken
***********************************************
elsif ($form{funktion} eq 'beslutsbank')
{

print<<_BESLUT_TOP_;
<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript"><!--
function PopUp(Anchor){
 url = Anchor;
  popUpWin = window.open(url,'PopUp','width=644,height=462');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
}
// -->
</script>
</head>
<body background="../bilder/bkgrnd3.gif" alink=silver link=silver vlink=silver
>
<form action="../beslutsbank/frame_popup.cgi" target="PopUp" METHOD=POST>
<table border=0 align=left cellpadding=4 width=600>
       <tr>
       <td width=234 height=55 >  </td>
       <td width=234 >  </td>
       <td width=234 >  </td>
       </tr>
       <tr>
       <td width=100% nowrap align=left valign=middle ><font face=helvetica
       size=2 color=silver>
       SÖKORD:</font>
       <input type=text size=24 name=nyckelord value="budget, kalkyl, etc">
       <font face=helvetica size=2 color=silver>
         DATUM:</font>
       <select  name="sqlvariabel">
       <option value="<">Tidigare &auml;n</option>
       <option value=">">Senare &auml;n</option>
       </select>
        
       <input type="Text" name="year" maxlenght=20 align="LEFT" size="4"><font
       face=helvetica size=2 color=silver> / </font>
       <input type="Text" name="month"  align="LEFT" size="2"><font
       face=helvetica size=2 color=silver> / </font>
       <input type="Text" name="day"  align="LEFT" size="2">
       </td>
       <td align=left><input type=submit value="S&ouml;k"
       onclick="javascript:PopUp()"></td>
       </tr>
       </table>
       </form>
       </body></html>
_BESLUT_TOP_
}
else
{
print<<_TOM_TOP_;
```

```
<html>
<head>
</head>
</body>
</HTML>
_TOM_TOP_
}


#**************** Tolka formul&auml;r ********************

sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}
```

```
#!/usr/bin/perl

################################################################################
# Program:   deadline.pl
# Datum:     22/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Sends an email to the responsible persons ~5 days before the
#            deadline is reached, in order to remind them that a
#            decision is close to reach its deadline date.
#
# Stored in DB:
#            avslut
#
################################################################################

#****************** Initiera subrutiner och variabler ***

use DBI;
sub send_mail;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$date = `date`;
$sekunder = time;
$datum = localtime $sekunder-(60*60*24*7);
@skall_uppdateras = ();

#****************** huvudprogram ***
print "Datum $date,  -> Deadline datum: $datum\n\n";

#************ Tar fram de beslutskort som nått deadline ***
$deadline_query = "select deadline,avslut,titel,vem,ansvarig_email,kod
                   from bank_kort where deadline > '$datum' and avslut =
'nej'";
$sth = $dbh->prepare($deadline_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
@deadline = $sth->fetchrow_array;
if ($deadline[4])
{
  send_mail ($deadline[4],$deadline[2],$deadline[3],$deadline[0]);
  print "Mailar: $deadline[4]\n"
}
$skall_uppdateras[$i] = $deadline[5];
}

#** Uppdatering - avslut ändras till 'ja' **
for ($i = 0; $i <= $#skall_uppdateras; $i++)
{
$rv = $dbh->do("update bank_kort set avslut='ja' where
kod=$skall_uppdateras[$i];");
}

$sth->finish;
$rv = $dbh  -> disconnect || warn $dbh->errstr;
```

```
#****************** Subrutiner ***

sub send_mail
{

my $to    =$_[0];
my $title =$_[1];
my $vem   =$_[2];
my $dat   =$_[3];

open (BREV, "|/usr/lib/sendmail -t -oi") or die ("Kan inte hitta sendmail:
$!");
print BREV <<_STOP_;
Mime-Version: 1.0
Content-Type: text/plain; charset=iso-8859-1
Content-Transfer-Encoding: quoted-printable
To: $to
From: DSS-Forum
Cc:
Subject: Ett beslut har nått deadline.

Beslut: $titel
Deadline: $dat
Berörda parter: $vem


(Automatiskt brevutskick från dss-systemet.)

_STOP_

close BREV;
}
```

```
################################################################################
# Program:    aktiveringsscript.js
# Datum:      7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             This script directs the requested site to the correct frame. The
#             program identifies which frame-variable is set and directs the
#             page to the correct destination.
#
################################################################################

function sidAktivering(sida,frameNr) {
parent.frames[frameNr].location.href=sida;
}

function scriptAktivering(funktion,frameNr) {
parent.frames[frameNr].location.href="javascript:" + funktion;
}
```

```
###############################################################################
# Program:    beslutstrad.js
# Datum:      7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Builds a graphical tree structure based on the information
#            collected from the database.
#
###############################################################################


function till(){
window.open('http://w3.informatik.gu.se/~dss98f-
2/dss/beslutsbank/beslut.html','window2','scrollbars=yes,resizable=yes,outerWid
th=540,outerHeight=410')
}


function Folder(folderDescription, hreference)
{
  //Konstanter
  this.desc = folderDescription
  this.hreference = hreference
  this.id = -1
  this.navObj = 0
  this.iconImg = 0
  this.nodeImg = 0
  this.isLastNode = 0

  //Dynamiska variabler
  this.isOpen = true
  this.iconSrc = "ftv2folderopen.gif"
  this.children = new Array
  this.nChildren = 0

  //metoder
  this.initialize = initializeFolder
  this.setState = setStateFolder
  this.addChild = addChild
  this.createIndex = createEntryIndex
  this.hide = hideFolder
  this.display = display
  this.renderOb = drawFolder
  this.totalHeight = totalHeight
  this.subEntries = folderSubEntries
  this.outputLink = outputFolderLink
}

function setStateFolder(isOpen)
{
  var subEntries
  var totalHeight
  var fIt = 0
  var i=0

  if (isOpen == this.isOpen)
```

```
    return

  if (browserVersion == 2)
  {
    totalHeight = 0
    for (i=0; i < this.nChildren; i++)
      totalHeight = totalHeight + this.children[i].navObj.clip.height
      subEntries = this.subEntries()
    if (this.isOpen)
      totalHeight = 0 - totalHeight
    for (fIt = this.id + subEntries + 1; fIt < nEntries; fIt++)
      indexOfEntries[fIt].navObj.moveBy(0, totalHeight)
  }
  this.isOpen = isOpen
  propagateChangesInState(this)
}

function propagateChangesInState(folder)
{
  var i=0

  if (folder.isOpen)
  {
    if (folder.nodeImg)
      if (folder.isLastNode)
        folder.nodeImg.src = "ftv2mlastnode.gif"
      else
         folder.nodeImg.src = "ftv2mnode.gif"
    folder.iconImg.src = "ftv2folderopen.gif"
    for (i=0; i<folder.nChildren; i++)
      folder.children[i].display()
  }
  else
  {
    if (folder.nodeImg)
      if (folder.isLastNode)
        folder.nodeImg.src = "ftv2plastnode.gif"
      else
         folder.nodeImg.src = "ftv2pnode.gif"
    folder.iconImg.src = "ftv2folderclosed.gif"
    for (i=0; i<folder.nChildren; i++)
      folder.children[i].hide()
  }
}

function hideFolder()
{
  if (browserVersion == 1) {
    if (this.navObj.style.display == "none")
      return
    this.navObj.style.display = "none"
  } else {
    if (this.navObj.visibility == "hiden")
      return
    this.navObj.visibility = "hiden"
  }

  this.setState(0)
}
```

```
function initializeFolder(level, lastNode, leftSide)
{
var j=0
var i=0
var numberOfFolders
var numberOfDocs
var nc

  nc = this.nChildren

  this.createIndex()

  var auxEv = ""

  if (browserVersion > 0)
       auxEv = "<font color=blue size=-1><a
       href='javascript:clickOnNode("+this.id+")'></Font>"
  else
    auxEv = "<a>"

  if (level>0)
    if (lastNode) //the last 'brother' in the children array
    {
       this.renderOb(leftSide + auxEv + "<font color=\"blue\" size=\"-1\"><img
       name='nodeIcon" + this.id + "' src='ftv2mlastnode.gif' width=16 height=22
       border=0></font></a>")
      leftSide = leftSide + "<img src='ftv2blank.gif' width=16 height=22>"
      this.isLastNode = 1
    }
    else
    {
       this.renderOb(leftSide + auxEv + "<font color=\"blue\" size=\"-1\"><img
       name='nodeIcon" + this.id + "' src='ftv2mnode.gif' width=16 height=22
       border=0></Font></a>")
      leftSide = leftSide + "<img src='ftv2vertline.gif' width=16 height=22>"
      this.isLastNode = 0
    }
  else
    this.renderOb("")

  if (nc > 0)
  {
    level = level + 1
    for (i=0 ; i < this.nChildren; i++)
    {
      if (i == this.nChildren-1)
        this.children[i].initialize(level, 1, leftSide)
      else
        this.children[i].initialize(level, 0, leftSide)
      }
  }
}

function drawFolder(leftSide)
{
  if (browserVersion == 2) {
    if (!doc.yPos)
      doc.yPos=8
```

```
      doc.write("<font color=\"blue\" size=\"-1\"><layer id='folder" + this.id
      + "' top=" + doc.yPos + " visibility=hiden></font>")
  }

  doc.write("<table ")
  if (browserVersion == 1)
    doc.write(" id='folder" + this.id + "' style='position:block;' ")
  doc.write(" border=0 cellspacing=0 cellpadding=0>")
  doc.write("<tr><td>")
  doc.write(leftSide)
  this.outputLink()
  doc.write("<font color=\"blue\" size=\"-1\"><img name='folderIcon" + this.id
  + "' ")
  doc.write("src='" + this.iconSrc+"' border=0></a>")
  doc.write("</td><td valign=middle nowrap>")
  if (USETEXTLINKS)
  {
    this.outputLink()
    doc.write(this.desc + "</a></font>")
  }
  else
  doc.write(this.desc)
  doc.write("</td>")
  doc.write("</table>")

  if (browserVersion == 2) {
    doc.write("</layer>")
  }

  if (browserVersion == 1) {
    this.navObj = doc.all["folder"+this.id]
    this.iconImg = doc.all["folderIcon"+this.id]
    this.nodeImg = doc.all["nodeIcon"+this.id]
  } else if (browserVersion == 2) {
    this.navObj = doc.layers["folder"+this.id]
    this.iconImg = this.navObj.document.images["folderIcon"+this.id]
    this.nodeImg = this.navObj.document.images["nodeIcon"+this.id]
    doc.yPos=doc.yPos+this.navObj.clip.height
  }
}

function outputFolderLink()
{
  if (this.hreference)
  {
    doc.write("<font color=\"blue\" size=\"-1\"><a href='" + this.hreference +
    "' TARGET=\"\" ")
    if (browserVersion > 0)
      doc.write("onClick='javascript:clickOnFolder("+this.id+")'")
    doc.write("></Font>")
  }
  else
    doc.write("<a>")
//  doc.write("<font color=\"blue\" size=\"-1\"><a
href='javascript:clickOnFolder("+this.id+")'></Font>")
}

function addChild(childNode)
{
```

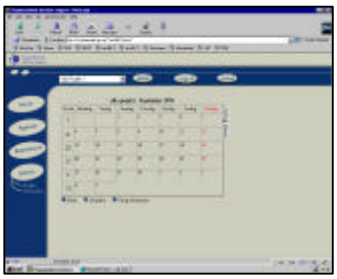
```
  this.children[this.nChildren] = childNode
  this.nChildren++
  return childNode
}

function folderSubEntries()
{
  var i = 0
  var se = this.nChildren

  for (i=0; i < this.nChildren; i++){
    if (this.children[i].children) //is a folder
      se = se + this.children[i].subEntries()
  }

  return se
}


// Definitioner av klasser (ett dokument eller en länk inom en mapp)
// *********************************************************

function Item(itemDescription, itemLink)
{
  // Konstanta variabler
  this.desc = itemDescription
  this.link = itemLink
  this.id = -1 //initialized in initalize()
  this.navObj = 0 //initialized in render()
  this.iconImg = 0 //initialized in render()
  this.iconSrc = "ftv2doc.gif"

  // metoder
  this.initialize = initializeItem
  this.createIndex = createEntryIndex
  this.hide = hideItem
  this.display = display
  this.renderOb = drawItem
  this.totalHeight = totalHeight
}

function hideItem()
{
  if (browserVersion == 1) {
    if (this.navObj.style.display == "none")
      return
    this.navObj.style.display = "none"
  } else {
    if (this.navObj.visibility == "hiden")
      return
    this.navObj.visibility = "hiden"
  }
}

function initializeItem(level, lastNode, leftSide)
{
  this.createIndex()

  if (level>0)
```

```
    if (lastNode) //the last 'brother' in the children array
    {
    this.renderOb(leftSide + "<img src='ftv2lastnode.gif' width=16 height=22>")
      leftSide = leftSide + "<img src='ftv2blank.gif' width=16 height=22>"
    }
    else
    {
      this.renderOb(leftSide + "<img src='ftv2node.gif' width=16 height=22>")
      leftSide = leftSide + "<img src='ftv2vertline.gif' width=16 height=22>"
    }
  else
    this.renderOb("")
}

function drawItem(leftSide)
{
  if (browserVersion == 2)
    doc.write("<layer id='item" + this.id + "' top=" + doc.yPos + "
    visibility=hiden>")

  doc.write("<table ")
  if (browserVersion == 1)
  doc.write(" id='item" + this.id + "' style='position:block;' ")
  doc.write(" border=0 cellspacing=0 cellpadding=0>")
  doc.write("<tr><td>")
  doc.write(leftSide)
  doc.write("<a href=" + this.link + ">")
  doc.write("<font color=\"blue\" size=\"-1\"><img id='itemIcon"+this.id+"' ")
  doc.write("src='"+this.iconSrc+"' border=0></font>")
  doc.write("</a>")
  doc.write("</td><td valign=middle nowrap>")
  if (USETEXTLINKS)
  doc.write("<font color=\"blue\" size=\"-1\"><a href=" + this.link + ">" +
  this.desc + "</a></Fort>")
  else
  doc.write(this.desc)
  doc.write("</table>")

  if (browserVersion == 2)
    doc.write("</layer>")

  if (browserVersion == 1) {
    this.navObj = doc.all["item"+this.id]
    this.iconImg = doc.all["itemIcon"+this.id]
  } else if (browserVersion == 2) {
    this.navObj = doc.layers["item"+this.id]
    this.iconImg = this.navObj.document.images["itemIcon"+this.id]
    doc.yPos=doc.yPos+this.navObj.clip.height
  }
}


// metodkommando till båda objekten
// ***************************************************

function display()
{
  if (browserVersion == 1)
    this.navObj.style.display = "block"
```

```
  else
    this.navObj.visibility = "show"
}

function createEntryIndex()
{
  this.id = nEntries
  indexOfEntries[nEntries] = this
  nEntries++
}

// total height of subEntries open
function totalHeight() //used with browserVersion == 2
{
  var h = this.navObj.clip.height
  var i = 0

  if (this.isOpen) //is a folder and _is_ open
    for (i=0 ; i < this.nChildren; i++)
      h = h + this.children[i].totalHeight()

  return h
}


// Händelser
// *********************************************************

function clickOnFolder(folderId)
{
  var clicked = indexOfEntries[folderId]

  if (!clicked.isOpen)
    clickOnNode(folderId)

  return

  if (clicked.isSelected)
    return
}

function clickOnNode(folderId)
{
  var clickedFolder = 0
  var state = 0

  clickedFolder = indexOfEntries[folderId]
  state = clickedFolder.isOpen

  clickedFolder.setState(!state) //open<->close
}

function initializeDocument()
{
  if (doc.all)
    browserVersion = 1 //IE4
  else
    if (doc.layers)
      browserVersion = 2 //NS4
```

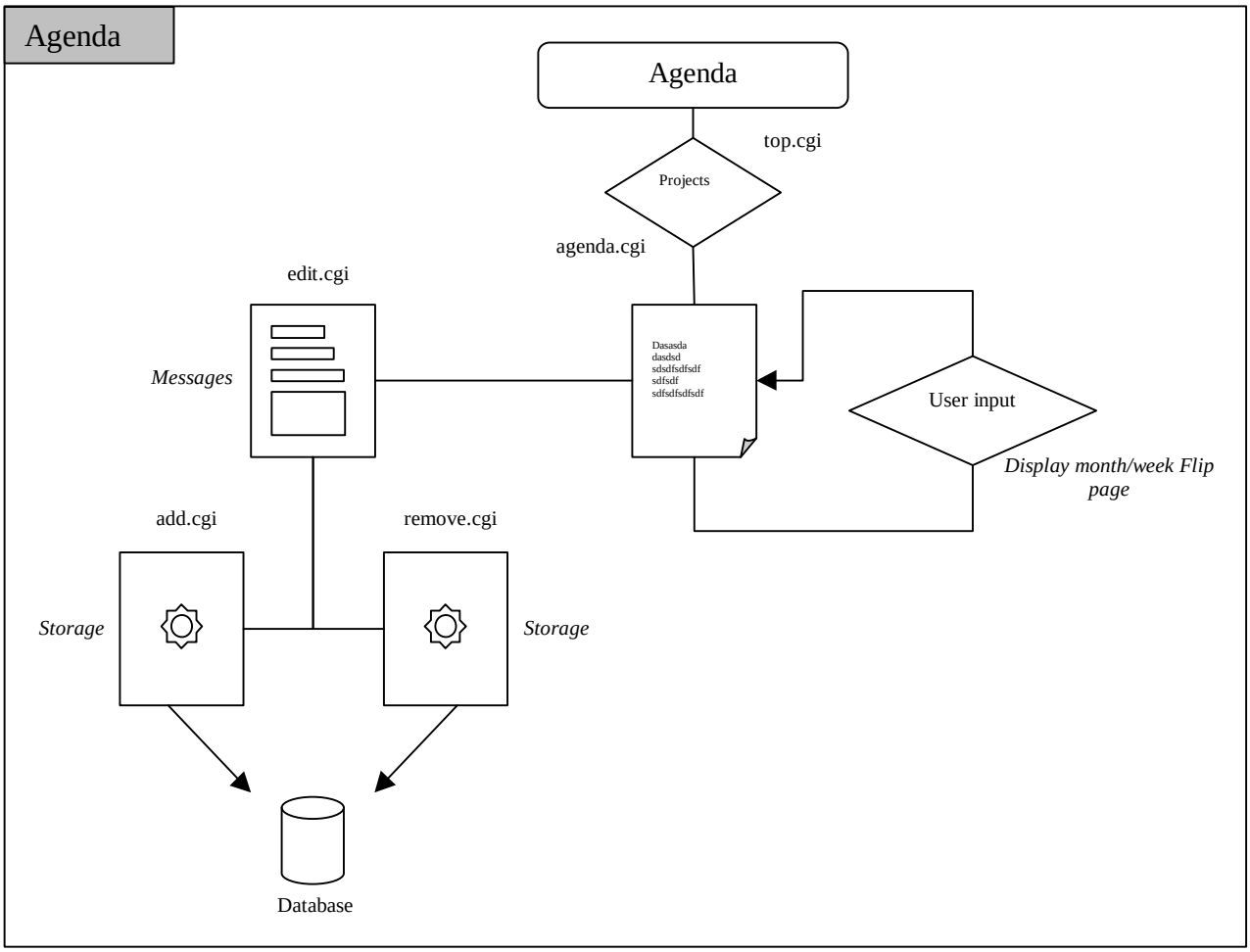
```
    else
      browserVersion = 0 //other

  foldersTree.initialize(0, 1, "")
  foldersTree.display()

  if (browserVersion > 0)
  {
      doc.write("<layer top="+indexOfEntries[nEntries-
      1].navObj.top+"> </layer>")

    // close the whole tree
    clickOnNode(0)
    // open the root folder
    clickOnNode(0)
  }
}


// ***************************************************

function gFld(description, hreference)
{
  folder = new Folder(description, hreference)
  return folder
}

function gLnk(target, description, linkData)
{
  fullLink = ""

  if (target==0)
  {
    fullLink = "'"+linkData+"' target=\"\""
  }
  else
  {
    if (target==1)
       fullLink = "'"+linkData+"' target=_blank"
    else
       fullLink = "'"+linkData+"' target=\"\""
  }

  linkItem = new Item(description, fullLink)
  return linkItem
}

function insFld(parentFolder, childFolder)
{
  return parentFolder.addChild(childFolder)
}

function insDoc(parentFolder, document)
{
  parentFolder.addChild(document)
}

// Globala variabler
// ***************
```

```
USETEXTLINKS = 0
indexOfEntries = new Array
nEntries = 0
doc = document
browserVersion = 0
selectedFolder=0
```



Agenda

The agenda is divided into two time schedules, - one showing the actual month for one information category, all (default) or for a specific project, the other showing the same information in the form of an open filofax showing two pages with one week of information each. It is possible to go back and forward in time using buttons for this purpose in both views.



```
#!/usr/bin/perl

##############################################################################
# Program:    add.cgi
# Date:       17/11-1998
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Update the calendar with the information from the input from.
#             (agenda)
#
# CGI-variables:
#             Date, monda, Description, hh, mm, html, adress, typ
#
# Stored in DB:
#             $form{projekt},'$date','$form{Description}','$typ'
#
##############################################################################

#****************** Filnamn ***
$editprg    = "edit.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
sub koda_till_mac;
sub tolka_formular;

#****************** Huvudprogram ***
tolka_formular;
print "Content-Type: text/html\nPragma: no-cache\n\n";

#********* Skriv det nya meddelandet ********
if ($form{"datum"} =~ m/^(\d{1,2})/ && $form{"monad"} =~ m/^(\d{1,2})/ &&
$form{"beskrivning"})
{
  #** Om tid specificerats, slå ihop den med meddelandet **
  if ($form{"hh"} || $form{"mm"})    {  $form{"beskrivning"} =
     "$form{\"hh\"}.$form{\"mm\"} $form{\"beskrivning\"}";  }

  $form{"beskrivning"} =~ s/<//gs;    #** Hindra folk från att lägga in SSI **
  $form{"beskrivning"} =~ s/>//gs;    #** Hindra folk från att lägga in SSI **
  koda_till_mac ("beskrivning");
  $form{"beskrivning"} =~ s/\n/<BR>/gs; #** Gör om radmatningar till <BR> **

if ($form{"html"} eq "ja")             #** Vill vi göra en html-länk? **
 {
   $adress = $form{"adress"};
   $form{"beskrivning"} = "<A HREF=\"$adress\"
TARGET=new>$form{\"beskrivning\"}</a>";
 }

#* Finns det redan medd på önskat datum? Addera då det till samma rad i listan
 $date = "$form{\"datum\"}/$form{\"monad\"}/$form{\"ar\"}";

#*** Hämta existerande meddelande på aktuellt datum ***
```

```
 $haemta_query = "select text,proj_kod,typ from agenda where datum = '$date'
and
 proj_kod=$form{projekt}";
 $sth = $dbh->prepare($haemta_query);
 $rader = $sth->execute;
 @medd = $sth->fetchrow_array;

 if ($medd[0]){$form{"beskrivning"} = "$medd[0]<BR>$form{\"beskrivning\"}"; }
 $typ = $medd[2];
 $typ = $typ|$form{"typ"};

#** Nu rensas dubbletten och det nya skriv in ***
 $rv = $dbh->do("delete from agenda where datum = '$date' and
 proj_kod=$form{projekt};");
 $rv = $dbh->do("insert into agenda values
 ($form{projekt},'$date','$form{beskrivning}','$typ');");

#***** Skriv ut html-sidan ***
 print <<_OUTPUT_;
 <body background=../bilder/bkgrnd2_3.gif>
 <PRE>
 <H2>Följande är adderat till kalendern:</H2>
 Datum:    $date
 Text:     $form{"beskrivning"}
 Html:     $form{"html"}
 Adress:   $form{"adress"}
 Typ:    $typ
 Projekt:  $form{"projekt"}
 <P><CENTER><A HREF="$editprg">Tillbaka</a>
 _OUTPUT_
}
else
{
 print "Vänligen fyll i både datum och meddelande!<P><CENTER><A
 HREF=\"$editprg\">Tillbaka</a>";
}
$dbh -> disconnect;

#**************** Subrutiner  ********************
#**************** Tolka formulär ********
sub tolka_formular
{
my ($buffer, @par, $i);
$buffer ="";
$buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'} eq
'POST';
$buffer =~ tr/+/ /;
@par = split /[&=]/, $buffer;
foreach $par (@par)
{
   $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
}
for ($i=0; $i<$#par; $i+=2)
{
   if ($form{$par[$i]})
   {
      $form{$par[$i]}.= "\n".$par[$i+1];
   }
```

```
   else
   {
      $form{$par[$i]} = $par[$i+1];
   }
}
}

#**************** Sub koda_till_mac ******************
sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'","/");
     my @mac    =
("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;","&acute\;","&#47
\;");
     my $i,$x;

for($i=0;$i<=$#matcha;$i++)
  {
   $form{"$matcha[$i]"} =~ s/\\/&#92\;/gs;
   for($x=0;$x<=$#tkn;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;
    }
  }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    agenda.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             The script prints out a calendar either weekly or monthly based on
#             the user chose. The calendar shows different appointments, notes
#             or deadlines related to decisions.
#
# CGI-variables:
#             proj, mode, mem, back, forward
#
##############################################################################

#****************** Filnamn ***
$mall_v  = "bokmall_v";       #*** HTML mallen till boken för veckovisning  **
$mall_m  = "bokmall_m";       #*** HTML mallen till boken för månadsvisning **

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
sub skapa_variabler;
sub make_week;
sub make_month;
sub laes_meddelanden_week;
sub laes_meddelanden_month;
sub print_agenda;
sub fixa_arrays_back;
sub fixa_arrays_fram;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
@datum = localtime;    #** Hämta systemdatum **
$tid = time;
#****************** Huvudprogram ***
print "Content-Type: text/html\n\n";

if ($datum[2] == 23) #** Här justeras och vintertid **
{
  $datum[2] = 22;
  $tid = $tid-3600;
}

if ($datum[2] == 00) #** Här justeras sommartid **
{
  $datum[2] = 01;
  $tid = $tid+3600;
}

tolka_formular;        #** Kolla om det finns en inmatning *****************
skapa_variabler;       #** Fixa variabler                                 ****

$proj = $form{proj};   #** Hänvisar till vilket projekt agendan skall visa *

#************ Hämtar projekttitlar ***
$proj_txt_query = "select titel from proj where proj_kod=$proj";
```

```
$sth = $dbh->prepare($proj_txt_query);
$rader = $sth->execute;
@proj_txt = $sth->fetchrow_array;
$proj_title = $proj_txt[0];
if ($proj eq "")
{$proj=0; $proj_title="Alla projekt";}  #** Om inget projekt angivits, visa
gemensamma-
                                        #** datum **
if ($form{mode} eq 'vecka')
{
 make_week;
 laes_meddelanden_week;
}
else
{
 make_month;
 laes_meddelanden_month;
}

$dbh -> disconnect;
print_agenda;

#***************** Subrutiner  ********************
#********** Sub skapa_variabler **
sub skapa_variabler
{
 $sek_dag = 86400;       #*** Sekunder på ett dygn **
 $b_mem = $form{'mem'}+1;#** Förbered 'mem' variabeln för nästa inmatning    **
 $f_mem = $form{'mem'}-1;#** Förbered 'mem' variabeln för nästa inmatning    **
 $mem   = $form{'mem'};  #** Läs vilken sida agendan är uppslagen på just nu **
 $mode  = $form{'mode'}; #** Läs vilket utseende agendan har just nu         **
}

#********************************* VECKA ***********************************
sub make_week
{
 $mall = $mall_v;
 $laengd = 14;          #*** Antal dagar visade i agendan **

#** Korrigera veckodagsräkning, mån=0 .. sön=6 *****
 $datum[6] = ($datum[6] -1);
 if ($datum[6] == -1) {$datum[6] = 6;}
 $start_dag = $datum[6];

#** Visa rätt sida ******************
if ($form{'back'} eq "back")                #** Bläddra bakåt **
{
   $tidminus = (($sek_dag*$start_dag)+($sek_dag*$laengd*$mem));
}
elsif ($form{'forward'} eq "forward")       #** Bläddra framåt **
{
   $tidminus = (($sek_dag*$start_dag)+($sek_dag*$laengd*$mem));
}
else                                          #** Slå upp denna vecka **
{
   $mem = 0;
   $tidminus = ($sek_dag*($start_dag));
}
```

```
#** Lägg in alla aktuella dagar och månader i vars en array ***
for ($i=0; $i<$laengd; $i++)
{
   @raeknadatum = localtime (($sek_dag*$i)+($tid-$tidminus));
   $dag[$i] = $raeknadatum[3];
   $monad[$i] = $raeknadatum[4]+1;      #** Plus ett eftersom Januari annars
blir 0 *
   $ar[$i] = $raeknadatum[5]+1900;
}
} #** Slut på week sub **


#********************************* MÅNAD ***********************************

sub make_month
{
@monad_namn = (Januari, Februari, Mars, April, Maj, Juni, Juli, Augusti,
September, Oktober, November, December);

$mall = $mall_m;
$laengd = 37;              #** Antal dagar visade i agendan **
$back = 1;                 #** Initiera variabeln för hur många dagar fram/bak
vi skall-
                          #** räkna **
@datum2 = @datum;          #** Lägg datum i en arbetsvariabel (@datum2) **
$memabs = abs $mem;        #** Gör absolutvärde av mem, används vid bläddring
fram/bak*

if ($mem == 0)      #********* Slå upp denna månad ************
{
$month = "$monad_namn[$datum[4]]  ".($datum[5]+1900);
#***** Så länge aktuellt datum är större än önskat så räknar vi tillbaka **
while (($datum2[4]>($datum[4])) || ($datum2[3] != 1))
{
  @datum2 = localtime ($tid - ($sek_dag*$back));
  $back++;
}
$back--;  #*** Här har vi antal dagar som skall räknas tillbaka **

fixa_arrays_back;

}  #** slut på denna månad ***

elsif ($mem > 0)    #****** Bläddra bakåt *********
{
$monad = $datum[4];
$year  = $datum[5];

for ($i=0; $i<$mem;$i++)
{
  if ($monad == 0)
   {
     $monad=11;
     $year--;
   }
  else
   {
     $monad--;
   }
```

```
}

$back = 1;
while ($datum2[3] != 1 || $datum2[4] != $monad || $datum2[5] !=$year)
{
@datum2 = localtime ($tid - ($sek_dag*$back));
$back++;
}
$back--;   #*** Här har vi antal dagar som skall räknas tillbaka **

$month = "$monad_namn[$monad]  ".($year+1900);

fixa_arrays_back;

} #** back slut **


elsif ($mem < 0)       #********** Bläddra framåt ************
{
$mem_abs = abs $mem;
$monad = $datum[4];
$year  = $datum[5];

for ($i=0; $i<$mem_abs;$i++)
{
  if ($monad == 11)
   {
     $monad=0;
     $year++;
   }
  else
   {
     $monad++;
   }
}

$back = 1;
while ($datum2[3] != 1 || $datum2[4] != $monad || $datum2[5] !=$year)
{
  @datum2 = localtime ($tid + ($sek_dag*$back));
  $back++;
}
$back--;    #*** Här har vi antal dagar som skall räknas tillbaka **

$month = "$monad_namn[$monad]  ".($year+1900);

fixa_arrays_fram;
} #** forward slut **

} #** Månads sub slut **

#*********** Sub laes_meddelanden VECKA **
sub laes_meddelanden_week
{
   for ($i=0; $i<$laengd; $i++)
    {
      $daytodo = "$dag[$i]/$monad[$i]/$ar[$i]";

       #************ Hämtar meddelanden ***
```

```
       $meddelande_query = "select * from agenda where datum='$daytodo'  and
        proj_kod=$proj";
       $sth = $dbh->prepare($meddelande_query);
       $rader = $sth->execute;
       @medd = $sth->fetchrow_array;
       $todo[$i] = $medd[2];
       #************
    }
}

#*********** Sub laes_meddelanden MÅNAD **
sub laes_meddelanden_month
{
$end = "";
   for ($i=0; $i<$laengd; $i++)
    {
      $daytodo  = "$dag[$i]/$monad[$i]/$ar[$i]";

       #************ Hämtar meddelanden ***
       $meddelande_query = "select * from agenda where datum='$daytodo' and
        proj_kod=$proj";
       $sth = $dbh->prepare($meddelande_query);
       $rader = $sth->execute;
       @medd = $sth->fetchrow_array;

       if($medd[2])
         {
       $bild = "";

       if(($medd[3] & "001") eq "001")
       { $bild = "<img src=\"../bilder/i_1.gif\" border=0>"; }

       if(($medd[3] & "010") eq "010")
       { $bild = "$bild"."<img src=\"../bilder/m_1.gif\" border=0>"; }

       if(($medd[3] & "100") eq "100")
       { $bild = "$bild"."<img src=\"../bilder/d_1.gif\" border=0>"; }

        $medd[2] =~ /<A HREF="(.*)">/;  #** Fixa länk **
        $link = $1;
        if (!$link){$link = "#";}

       $todo[$i] = "<A HREF=$link onMouseover=\"show('lager$i')\"
        onMouseout=\"hide('lager$i')\" TARGET=new>$bild</A>";

       $end = "$end"."
       <DIV ID=\"lager$i\" CLASS=\"test1\" align=\"left\">
       <FONT color=\"#0f0f0f\" SIZE=\"2\" FACE=\"sans-serif, helvetica, arial\">
       <P>$medd[2]</P></font></DIV>
       <AREA SHAPE=RECT COORDS=\"25,31,214,55\" HREF=
       \"http://w3.informatik.gu.se/~dss98f-2\"
       onMouseover=\"show('lager$i')\" onMouseout=\"hide('lager$i')\">
       <AREA SHAPE=CIRCLE COORDS=\"123,24,23\"
       HREF=\"http://w3.informatik.gu.se/~
       dss98f-2\"
       onMouseover=\"show('lager$i')\" onMouseout=\"hide('lager$i')\">";
       }
    }
}
```

```
#******** Sub print_agenda VECKA *****
sub print_agenda
{
open MALL, "<$mall" or die ("Kan ej öppna bokmallen $!");
while ($rad = <MALL>)
{
   $rad =~ s/--(\$dag\[\d+\])--/eval $1/eg;    #** Infoga datumnummer        **
   $rad =~ s/--(\$monad\[\d+\])--/eval $1/eg;  #** Infoga månadsnummer       **
   $rad =~ s/--(\$month)--/eval $1/eg;         #** Infoga månadsnamn och år  **
   $rad =~ s/--(\$todo\[\d+\])--/eval $1/eg;   #** Infoga händelser          **
   $rad =~ s/--(\$f_mem)--/eval $1/eg;         #** Skriv mem till javascrip **
   $rad =~ s/--(\$b_mem)--/eval $1/eg;         #** Skriv mem till javascrip **
   $rad =~ s/--(\$mode)--/eval $1/eg;          #** Skriv mode till javascrip**
   $rad =~ s/--(\$proj)--/eval $1/eg;          #** Skriv proj till javascrip**
   $rad =~ s/--(\$proj_title)--/eval $1/eg;    #** Skriv proj i huvudet      **
   print $rad;                                 #** Skriv ut raden på skärmen **
}
close MALL;
print "$end </body></html>";
}

#******* Sub tolka_formular **********
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}

#******* Sub fixa_arrays_back **********
sub fixa_arrays_back
{
#*** Ta fram veckodagen på den 1:a i månaden och ta fram hur många -
#** dagar som skall hoppas över **

@datum2 = localtime ($tid - ($back*$sek_dag)); #** Dagen vi skall börja på **
$datum2[6] = ($datum2[6]-1);             #** Veckodagen vi skall börja på **
if ($datum2[6] == -1) {$datum2[6] = 6;}
```

```
$skip_days = $datum2[6];   #** skip_days innehåller nu 0:a för måndag, 6 för
sön **

#*** Lagra ner datum som skall visas i arrayen , hoppa över veckodagar -
#** som inte skall visas i början på månaden **
$count = 0;
for ($i=0; $i<$laengd; $i++)
{
   if ($skip_days > $i)  { $dag[$i] = ' ';}
   else
   {
   @raeknadatum = localtime ($tid - (($back-$count)*$sek_dag));
   $dag[$i] = $raeknadatum[3];
   $monad[$i] = $raeknadatum[4]+1; #** Plus ett eftersom Januari annars blir 0*
   $ar[$i] = $raeknadatum[5]+1900;
   $count++;
   }
}
}

#******* Sub fixa_arrays_fram **********
sub fixa_arrays_fram
{
#*** Ta fram veckodagen på den 1:a i månaden och ta fram hur många -
#** dagar som skall hoppas över **

@datum2 = localtime ($tid + ($back*$sek_dag)); #** Dagen vi skall börja på **
$datum2[6] = ($datum2[6]-1);             #** Veckodagen vi skall börja på **
if ($datum2[6] == -1) {$datum2[6] = 6;}
$skip_days = $datum2[6];   #** skip_days innehåller nu 0:a för mån,6 för sön **

#*** Lagra ner datum som skall visas i arrayen , hoppa över veckodagar -
#** som inte skall visas i början på månaden **
$count = 0;
for ($i=0; $i<$laengd; $i++)
{
   if ($skip_days > $i)  { $dag[$i] = ' ';}
   else
   {
   @raeknadatum = localtime ($tid + (($back+$count)*$sek_dag));
   $dag[$i] = $raeknadatum[3];
   $monad[$i] = $raeknadatum[4]+1;  #** Plus ett eftersom Jan annars blir 0 ***
   $ar[$i] = $raeknadatum[5]+1900;
   $count++;
   }
}
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   edit.cgi
# Date:      17/11-1998
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out an input-form to create new messages and a list of
#            current messages in order to delete them.
#
##############################################################################

#****************** Filnamn ***
$agendatext = "agenda.txt";       #*** Textfilen som inneh. alla meddelande **
$agendaprg  = "agenda.cgi";       #*** Programmet som kör agendan **
$tabortprg  = "remove.cgi";       #*** Prog som tar bort poster ur agenda.txt**
$addprg     = "add.cgi";          #*** Programmet som lägger till poster **

#****************** Initiera subrutiner och variabler ***
use DBI;
$year = `date '+%y'`; $year = $year+1900;  #*** Hämtar årtal **
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$baest_fore = $year-2;

#****************** Huvudprogram ***
#*** Rensa bort gamla meddelanden ***
$rv = $dbh->do("delete from agenda where datum like '%$baest_fore';");

#******** Skriv ut ändrings formuläret *****************
print "Content-Type: text/html\nPragma: no-cache\n\n";
print"<body background=../bilder/bkgrnd2.gif>";
print "<CENTER><A HREF=\"$agendaprg\">[Tillbaka till
kalendern.]</a><P></CENTER>";

#******* Formulär för att lägga till meddelanden *******
$year0 = $year-1;
$year1 = $year+1;
$year2 = $year+2;

print <<_HTML_;
<FORM ACTION="$addprg" METHOD="POST">
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr>
      <td>
      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  width=585 background="../bilder/bkgrnd2.gif">
      <tr>
      <td width="12" height="25" align="left" valign="top"
      background="../bilder/bkgrnd22.gif"><img src="../bilder/corner1.gif"
      width=12 height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" height="35" align="center" valign="bottom"
      background="../bilder/bkgrnd22.gif"><img
      src="../bilder/form_agenda_text1.gif" width=272 height=21 hspace=0
      vspace=0 border=0 align="middle" alt=""><br><hr></td>
```

```
<td width="12" align="right" valign="top"
background="../bilder/bkgrnd22.gif"><img src="../bilder/corner2.gif"
width=11 height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="../bilder/bkgrnd22.gif" height="20"> </td>
<td width="100%" align="left" valign="bottom"
background="../bilder/bkgrnd22.gif">
<table border="0" align="left" cellspacing="0" cellpadding="8"
valign="top" background="../bilder/bkgrnd2.gif">
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="../bilder/bkgrnd22.gif"><img
src="../bilder/form_agenda_1.gif" width=47 height=30 hspace=0 vspace=0
border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="../bilder/bkgrnd22.gif">
<SELECT NAME="ar" style=".ackground: #FFFFFF">
                    <OPTION  SELECTED VALUE=1999>1999
                    <OPTION VALUE=2000>2000
                    <OPTION VALUE=2001>2001
                    <OPTION VALUE=1998>1998
                    </SELECT>

<font face=helvetica size=3 face=helvetica
color=silver> / </font>
<SELECT NAME="monad" style=".ackground: #FFFFFF">
                    <OPTION  SELECTED VALUE=1>1
                    <OPTION VALUE=2>2
                    <OPTION VALUE=3>3
                    <OPTION VALUE=4>4
                    <OPTION VALUE=5>5
                    <OPTION VALUE=6>6
                    <OPTION VALUE=7>7
                    <OPTION VALUE=8>8
                    <OPTION VALUE=9>9
                    <OPTION VALUE=10>10
                    <OPTION VALUE=11>11
                    <OPTION VALUE=12>12
                    </SELECT>

<font face=helvetica size=3 face=helvetica
color=silver> / </font>
<SELECT NAME="datum" style=".ackground: #FFFFFF">
                    <OPTION  SELECTED VALUE=1>1
                    <OPTION VALUE=2>2
                    <OPTION VALUE=3>3
                    <OPTION VALUE=4>4
                    <OPTION VALUE=5>5
                    <OPTION VALUE=6>6
                    <OPTION VALUE=7>7
                    <OPTION VALUE=8>8
                    <OPTION VALUE=9>9
                    <OPTION VALUE=10>10
                    <OPTION VALUE=11>11
                    <OPTION VALUE=12>12
                    <OPTION VALUE=13>13
                    <OPTION VALUE=14>14
```

```
                              <OPTION VALUE=15>15
                              <OPTION VALUE=16>16
                              <OPTION VALUE=17>17
                              <OPTION VALUE=18>18
                              <OPTION VALUE=19>19
                              <OPTION VALUE=20>20
                              <OPTION VALUE=21>21
                              <OPTION VALUE=22>22
                              <OPTION VALUE=23>23
                              <OPTION VALUE=24>24
                              <OPTION VALUE=25>25
                              <OPTION VALUE=26>26
                              <OPTION VALUE=27>27
                              <OPTION VALUE=28>28
                              <OPTION VALUE=29>29
                              <OPTION VALUE=30>30
                              <OPTION VALUE=31>31
                              </SELECT>
      <font face=helvetica size=2 face=helvetica
      color=silver><i>(1999/12/31)</i></font>
         
      <img src="../bilder/form_agenda_2.gif" width=47 height=30 hspace=0
      vspace=0 border=0 alt="">
      <INPUT TYPE=text NAME="hh" SIZE="2" MAXLENGTH="2">
      <font face=helvetica size=3 face=helvetica color=silver>:</font>
      <INPUT TYPE=text NAME="mm" SIZE="2" MAXLENGTH="2"> 
      <font face=helvetica size=2 face=helvetica
      color=silver><i>(hh:mm)</i></font>
      </td>
      <td width="42" align="right" valign="bottom"
      background="../bilder/bkgrnd22.gif"></td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif"><img
      src="../bilder/form_agenda_3.gif" width=47 height=30 hspace=0 vspace=0
      border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <SELECT NAME="typ" style=".ackground: #FFFFFF">
                           <OPTION  SELECTED VALUE="001">Information
                           <OPTION VALUE="010">Möte
                           <OPTION VALUE="100">Deadline

      </SELECT>         
      <img src="../bilder/form_agenda_4.gif" width=47 height=30 hspace=0
      vspace=0 border=0 alt="">
      <SELECT NAME="projekt" style=".ackground: #FFFFFF">
      <OPTION  SELECTED VALUE=0>Allmänt

_HTML_
#************ Hämtar projekt ***
$proj_query = "select titel,proj_kod from proj'";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
@proj = $sth->fetchrow_array;
```

```
print "<OPTION VALUE=$proj[1]>$proj[0]";
}

print <<_HTML_;

       </SELECT>
       </td>
       <td width="42" align="right" valign="bottom"
       background="../bilder/bkgrnd22.gif"></td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="../bilder/bkgrnd22.gif"><img
       src="../bilder/form_agenda_5.gif" width=47 height=30 hspace=0 vspace=0
       border=0 align="left" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="../bilder/bkgrnd22.gif"><TEXTAREA COLS=46 ROWS=2
       NAME="beskrivning" ></TEXTAREA></td>
       <td width="42" align="right" valign="bottom"
       background="../bilder/bkgrnd22.gif"> </td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="../bilder/bkgrnd22.gif"><img
       src="../bilder/form_agenda_6.gif" width=47 height=30 hspace=0 vspace=0
       border=0 align="left" alt=""></td>
       <td width="100%" valign="bottom" background="../bilder/bkgrnd22.gif">
       <INPUT TYPE="checkbox" NAME="html" VALUE="ja">
       <font face=helvetica size=2 face=helvetica color=silver>HTML-
       länk</font><br>
       <INPUT TYPE=text NAME="adress" VALUE="http://" SIZE="40"
       </td>
       <td width="42" align="right" valign="bottom"
       background="../bilder/bkgrnd22.gif"></td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="../bilder/bkgrnd22.gif"><img src="../bilder/fomr_posta2.gif"
       width=47 height=30 hspace=0 vspace=0 border=0 align="bottom" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="../bilder/bkgrnd22.gif"><input  type=submit value="Skicka
       in"></td>
       <td width="42" align="right" valign="bottom"
       background="../bilder/bkgrnd22.gif"></td>
       </tr>
       </table>
       </td>
       <td width="12" align="right" valign="bottom"
       background="../bilder/bkgrnd22.gif" height="20"> </td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="../bilder/bkgrnd22.gif"><img src="../bilder/corner3.gif"
       width=12 height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="../bilder/bkgrnd22.gif"> </td>
       <td width="12" align="right" valign="bottom"
       background="../bilder/bkgrnd22.gif"><img src="../bilder/corner4.gif"
       width=11 height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
```

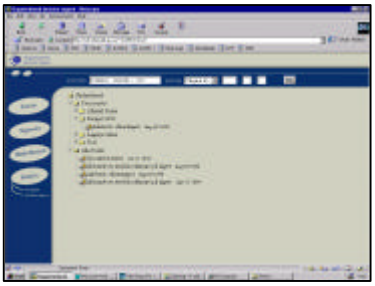
```
      </tr>
      </table>
      </td>
      </tr>
</table>
</form>
_HTML_

print <<_HTML_;
<FORM ACTION="$tabortprg" METHOD="POST">
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr>
      <td>
      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  width=585 background="../bilder/bkgrnd2.gif">
      <tr>
      <td width="46" height="25" align="left" valign="top"
      background="../bilder/bkgrnd22.gif"><img src="../bilder/corner1.gif"
      width=12 height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="center" valign="bottom"
      background="../bilder/bkgrnd22.gif"><img
      src="../bilder/form_agenda_text.gif" width=272 height=21 hspace=0
      vspace=0 border=0 align="middle" alt=""></td>
      <td width="12" align="right" valign="top"
      background="../bilder/bkgrnd22.gif"><img src="../bilder/corner2.gif"
      width=11 height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="center" valign="bottom"
      background="../bilder/bkgrnd22.gif" height="20">
      <font face=helvetica size=2 face=helvetica color=silver>
      Dessa meddelande finns förnärvarande, markera de du vill ta
      bort.</font><br><hr> </td>
      <td width="12" align="right" valign="bottom"
      background="../bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <table border="0" align="left" cellspacing="0" cellpadding="2"
      valign="top" background="../bilder/bkgrnd2.gif">
      <tr>
      <td width="72" height="20" nowrap align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>Datum</font>
      </td>
      <td width="200" nowrap align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica
      color=silver>Beskrivning</font>
      </td>
      <td width="42" align="right" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>Radera</font>
```

```
      </td>
      <td width="100%" align="right" valign="bottom"
      background="../bilder/bkgrnd22.gif"> </td>
      </tr>
_HTML_

#************ Hämtar meddelanden ***
$meddelande_query = "select * from agenda order by proj_kod'";
$sth = $dbh->prepare($meddelande_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
 @medd = $sth->fetchrow_array;
 $tabort_kod = "$medd[0]"."_"."$medd[1]";

 print <<_HTML_;

      <tr>
      <td width="72" height="20" nowrap align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica
      color=silver><i>$medd[1]</i></font>
      </td>
      <td width="200" nowrap align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>$medd[2]</font>
      </td>
      <td width="42" align="center" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <INPUT TYPE=\"checkbox\" NAME=\"chkbox\" VALUE=\"$tabort_kod\" ><br>
      </td>
      <td width="100%" align="right" valign="bottom"
      background="../bilder/bkgrnd22.gif"> </td>
      </tr>
 _HTML_
}

print <<_HTML_;
      <tr>
      <td width="72" height="20" nowrap align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      </td>
      <td width="200" nowrap align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      <br><INPUT TYPE=submit VALUE="Ta bort">
      </td>
      <td width="42" align="center" valign="bottom"
      background="../bilder/bkgrnd22.gif">
      </td>
      <td width="100%" align="right" valign="bottom"
      background="../bilder/bkgrnd22.gif"> </td>
      </tr>
      </table>
      </td>
      <td width="12" align="right" valign="bottom"
      background="../bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
```

```
      <td width="12" align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif"><img src="../bilder/corner3.gif"
      width=12 height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="../bilder/bkgrnd22.gif"> </td>
      <td width="12" align="right" valign="bottom"
      background="../bilder/bkgrnd22.gif"><img src="../bilder/corner4.gif"
      width=11 height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      </table>
      </td>
      </tr>
</table>
</form>
_HTML_

$dbh -> disconnect;
```

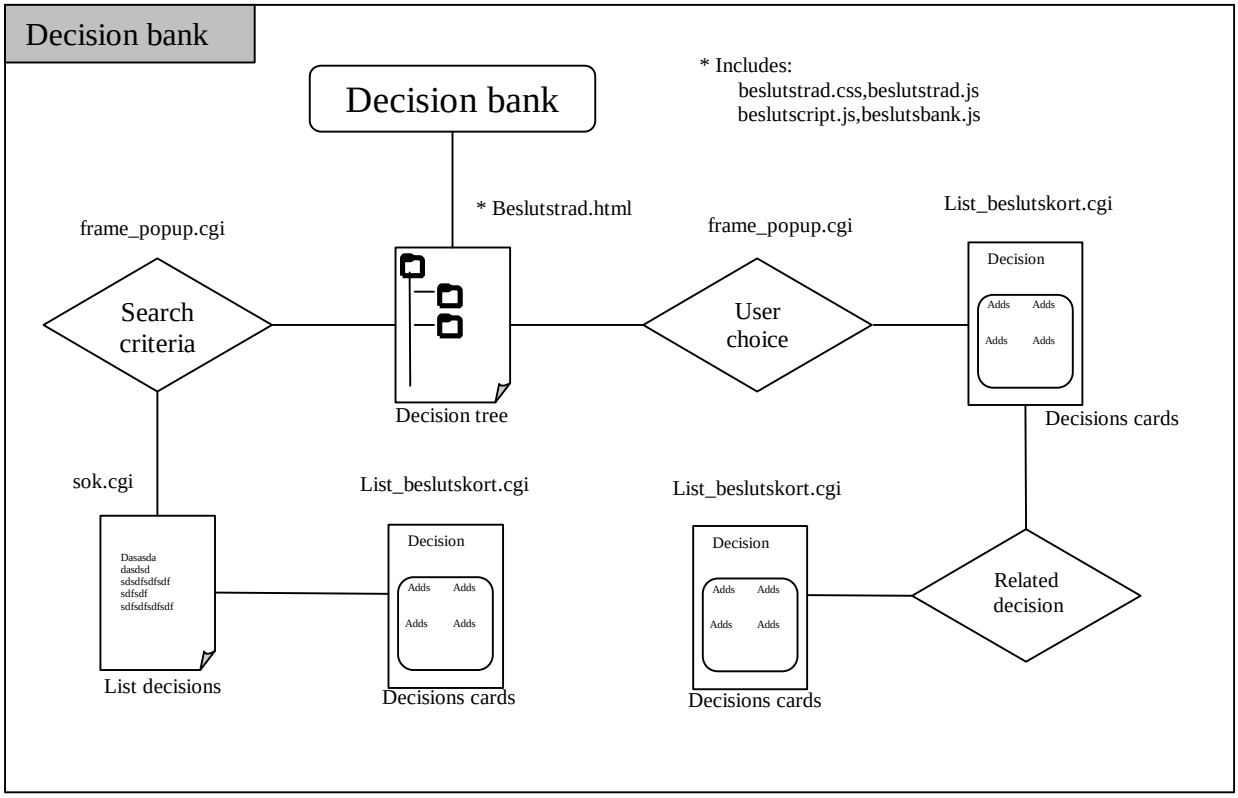
```
#!/usr/bin/perl

##############################################################################
# Program:    remove.cgi
# Date:       17/11-1998
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Remove specified messages from the calendar.
#
# CGI-variables:
#             chkbox (markerade meddelanden)
#
##############################################################################

#****************** Filnamn ***
$editprg    = "edit.cgi";         #*** Programmet som editerar agendan **

#****************** Initiera subrutiner och variabler ***
use DBI;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
sub tolka_formular;
print "Content-Type: text/html\nPragma: no-cache\n\n<body
background=../bilder/bkgrnd2.gif>";
tolka_formular;
@chkbox = split " ", $form{chkbox};

foreach $rad (@chkbox)
{
 $rad   =~ m/(\d+)_(.+)/;
 $proj  = $1;
 $datum = $2;
 print "$rad : Raderar meddelande $datum<BR>";
 $rv = $dbh->do("delete from agenda where datum = '$datum' and
 proj_kod=$proj;");
}

print "<P><A HREF=\"$editprg\">Tillbaka</a>";
$dbh -> disconnect;

#****************** Subrutiner ***
#****************** Sub tolka_formular ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
```

```
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
```



Decision bank

This subsystem, the dicision bank is the organisational memory part of the ODSS. The subsystem automatically organizes all decisions which are outputs from the subsystem forum. In addition to the dicision tree there is also a possibility to use a specific search criteria to seek for decisions.



```
#!/usr/bin/perl

##############################################################################
# Program:    frame_popup.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             This script, direct the requested page to a popup-window. It also
#             check the information given by the user, and translates any
#             Swedish character to Unicode.
#
# CGI-variables:
#             nyckelord, funktion, num
#
##############################################################################

#***** Koda om å,ä och ö samt fixa avkodning av specialtecken ***
#      å = %E5
#      Å = %C5
#      ä = %E4
#      Ä = %C4
#      ö = %F6
#      Ö = %D6
# Ytterligare information om koder finns
# i beslutsbank/character.htm
#**********************************

#****************** Initiera subrutiner och variabler ***
use DBI;
sub fixa_datum;
sub tolka_formular;
sub felkontroll;
sub kontroll_datum;
sub koda_till_mac;

#****************** Huvudprogram ***
print "Content-Type: text/html\nPragma: no-cache\n\n";
tolka_formular;
koda_till_mac ("nyckelord");

$i=0;
@nyckelord_split = split ", ", $form{nyckelord};
foreach $ord (@nyckelord_split)
{
       if ($i < 1){
       $nyckelord = "$ord";
       } else {
       $nyckelord = "$nyckelord,$ord";
       }
  $i++;

}

if ($form{funktion} eq 'info'){

print<<_BESLUTSBANK_POPUP_;
```

```
      <frameset  rows="71%,*" >
      <frame name="top" src="../forum/beslutskort.html" marginwidth="1"
      marginheight="1" scrolling="auto" bordercolor="silver" frameborder="yes">
      <frame name="center"
      src="../beslutsbank/sok.cgi?num=$form{num}&funktion=$form{funktion}"
      marginwidth="10" marginheight="10" scrolling="auto" bordercolor="blue"
      frameborder="yes" >
      </frameset>

_BESLUTSBANK_POPUP_

}elsif ($form{funktion} eq 'bank'){

print<<_BESLUTSBANK_POPUP_;
      <frameset  rows="71%,*" >
      <frame name="top" src="../forum/list_beslutskort.cgi?num=$form{num}"
      marginwidth="1" marginheight="1" scrolling="auto" bordercolor="silver"
      frameborder="yes">
       <frame name="center"
      src="../beslutsbank/relaterade_beslut.cgi?num=$form{num}&funktion=$form{f
      unktion}" marginwidth="10" marginheight="10" scrolling="auto"
      bordercolor="blue" frameborder="yes" >
       <!--frame name="center"
      src="../beslutsbank/sok.cgi?num=$form{num}&funktion=$form{funktion}"
      marginwidth="10" marginheight="10" scrolling="auto" bordercolor="blue"
      frameborder="yes" -->
      </frameset>
_BESLUTSBANK_POPUP_

}else{

print<<_BESLUTSBANK_POPUP_;
      <frameset  rows="71%,*">
       <frame name="top" src="../forum/beslutskort.html" marginwidth="1"
      marginheight="1" scrolling="auto" bordercolor="silver" frameborder="yes">
       <frame name="center"
      src="../beslutsbank/sok.cgi?nyckelordframe=$nyckelord&day=$form{day}&mont
      h=$form{month}&year=$form{year}&sqlvariabel=$form{sqlvariabel}"
      marginwidth="10" marginheight="10" scrolling="auto" bordercolor="blue"
      frameborder="yes" >
      <!--frame name="center"
      src="../beslutsbank/frame_test.cgi?nyckelordframe=$nyckelord&day=$form{da
      y}&month=$form{month}&year=$form{year}&sqlvariabel=$form{sqlvariabel}"
      marginwidth="10" marginheight="10" scrolling="auto" bordercolor="blue"
      frameborder="yes" -->
      </frameset>
_BESLUTSBANK_POPUP_
}

#****************** Subrutiner ***
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
```

```
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}

#****************** Sub koda_till_mac ***
sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'", "/");
     my @mac    = ("%E5","%C5","%E4","%C4","%F6","%D6","%27", "\/");
     my $i,$x;

for($i=0;$i<=$#matcha;$i++)
  {
   for($x=0;$x<=$#mac;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;

      }
 }

}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    list_beslutskort.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Collects the information from the bank_kort table related to a
#             specified decision and print this into a decision-card.
#
# CGI-variables:
#             num
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
sub fixa_datum;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;
print "Content-Type: text/html\nPragma: no-cache\n\n";

#***** Skriv ut toppen av html-sidan ***
print <<_TOP_;
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Organizational decision support</title>
</head>

<body background="bilder/bkgrnd2.gif" alink=silver link=silver vlink=silver
><br>
<table width="223" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr>
      <td>
      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  background="bilder/bkgrnd2.gif">
      <tr>
      <td width="12" height="20" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/icocard.gif" width=16
      height=16 hspace=0 vspace=2 border=0 align="left" alt=""><img
      src="bilder/txtbeslutskort.gif" width=95 height=21 hspace=0 vspace=0
      border=0 align="middle" alt=""><br><br>
      </td>
      <td width="12" align="right" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      <tr>
```

```
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
_TOP_


#************** hämtar sökresultat från korttabelen ********************
$kort_query = "select * from bank_kort where kod = $form{num}";
$sth = $dbh->prepare($kort_query);
$rader = $sth->execute;
#************

for ($i = 0; $i < $rader; $i++)
{
@kort = $sth->fetchrow_array;
$datum = fixa_datum $kort[2];

print <<_MAIN_;
      <!-- Beslutskort header start. variabler: titel, ID, datum  -->
      <table border="0" nowrap align="left" cellspacing="0" cellpadding="2"
      valign="top" background="bilder/bkgrnd2.gif">
      <tr>
      <td width="42" height="15" align="Right" valign="bottom"
      background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
      color="white">Titel:</font></td>
      <td nowrap width="350" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
      color="Silver"><b>$kort[3]</b></font></td>
      <td width="100%" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
      color="white">Datum:</font></td>
      <td  nowrap width="70" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
      color="Silver">$datum</font></td>
      </tr>
      </table>
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <hr width="495"  align="Center">
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      </tr>
      <!-- Beslutskort header slut -->
      <!-- Beslutskort huvud start. variabler: Baseratpa, beslutat,
      berordaparter, konsekvens, deadline, attachment -->
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
```

```
<table border="0" nowrap align="left" cellspacing="0" cellpadding="3"
valign="top" background="bilder/bkgrnd2.gif">
<tr>
<td nowrap width="250" height="65" align="left" valign="top"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Baserat på:<br></font>
<font face="times new roman" size="2" color="Silver">$kort[4]</font>
</td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
color="white">Beslutat:<br></font>
<font face="times new roman" size="2" color="Silver">$kort[5]</font>
</td>
</tr>
<tr>
<td nowrap width="250" height="65" align="left" valign="top"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Berörda parter:<br></font>
<font face="times new roman" size="2" color="Silver">$kort[6]</font>
</td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
color="white">Konsekvens:<br></font>
<font face="times new roman" size="2" color="Silver">$kort[7]</font>
</td>
</tr>
</table>
<!-- Beslutskort huvud slut -->
</td>
<td width="12" align="right" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<!-- Beslutskort attachmnet. Variabler: Deadline, attachment -->
<table border="0" nowrap align="left" cellspacing="0" cellpadding="1"
valign="top" background="bilder/bkgrnd2.gif">
<tr>
<td nowrap width="250" height="5" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Deadline:</font>
<font face="times new roman" size="2" color="Silver"><br>$kort[8]</font>
</td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
color="white">Bifogat:</font></td>
<!-- nytt attachment -->
</tr>
<tr>
<td nowrap width="250" height="5" align="left" valign="top"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">ansvaras av:</font>
<font face="times new roman" size="2"
color="Silver"><br>$kort[11]</font></td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"> 
```

```
       <font face="times new roman" size="2" color="Silver"><a
       href=#>$kort[9]</a></font>
       </td>
       </tr>
       </table>
       <!-- Beslutskort attachmnet slut -->
_MAIN_
}

print <<_BOTTOM_;
       </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif">
       <hr width="495"  align="Center">
       </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
       height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
       height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
       </tr>
       </table>
       </td>
       </tr>
</table>
<br>
</body>
</html>
_BOTTOM_

$dbh -> disconnect;

#****************** Subrutiner ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
```

```
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}

#***** Felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}

sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5";
  return $datum;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    relaterade_beslut.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Prints out a linked button for seeking related decisions.
#
#
# CGI-variables:
#             ide_kod, funktion
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;

#****************** Huvudprogram ***
tolka_formular;
print "Content-Type: text/html\n\n";

#***** Skriv ut toppen av html-sidan ***
print<<_BESLUTSKORT_HEADER_;
<html>
<head>
<title>Organizational decision support</title>
</head>
<body background=../bilder/bkgrnd2.gif>
<FORM METHOD=POST action="../beslutsbank/sok.cgi">
<input type=HIDDEN name=num value=$form{num}>
<input type=HIDDEN name=funktion value=$form{funktion}>
_BESLUTSKORT_HEADER_

print<<_BESLUTSKORT_MAIN_;
<br>
<center><input type=submit value="Visa relaterade belslut"></center>
_BESLUTSKORT_MAIN_

#***** Skriv ut botten av html-sidan ***
print<<_BESLUTSKORT_FOOTER_;
</form>
</body>
</html>
_BESLUTSKORT_FOOTER_

#****************** Subrutiner ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
```

```
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}


sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5  $4";
  return $datum;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    skapa_beslut_fil.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Creates the file containing the structure for the folder-tree and
#             a file containing all the java-script used for displaying each
#             decision in a popup-window.
#
##############################################################################

#****************** Filnamn ***
$beslutfil = "beslutsbank.js";
$scriptfil  = "beslutscript.js";
$visa_prg = "frame_popup.cgi";

#****************** Initiera subrutiner och variabler ***
use DBI;
sub fixa_datum;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$LOCK_EX = 2;

#****************** Huvudprogram ***
print "Content-Type: text/html\n\nok";

open (BANK,   ">$beslutfil") or die "open: $!";
open (SCRIPT, ">$scriptfil") or die "open: $!";

flock BANK,   $LOCK_EX;  #*** Sätter lås på filerna ***
flock SCRIPT, $LOCK_EX;

print BANK "foldersTree = gFld(\"<i>Beslutsbank</i>\", \"\")\n";
print BANK "aux1 = insFld(foldersTree, gFld(\"Per projekt\", \"\"))\n";

#************ Hämtar ett projekt ***
$projekt_query = "select proj_titel from bank_kort group by proj_titel";
$sth = $dbh->prepare($projekt_query);
$rader_p = $sth->execute;
#************

for ($i = 0; $i < $rader_p; $i++)
{
  @proj = $sth->fetchrow_array;

  print BANK "aux2 = insFld(aux1, gFld(\"$proj[0]  \;\", \"\")) \n";

  #************ Hämtar alla beslut till detta projekt ***
  $beslut_query = "select titel,datum,kod from bank_kort where
  proj_titel='$proj[0]'";
  $sth2 = $dbh2->prepare($beslut_query);
  $rader2 = $sth2->execute;
  #************
```

```
  for ($ii = 0; $ii < $rader2; $ii++)
   {
    @beslut = $sth2->fetchrow_array;
    $datum_beslut = fixa_datum $beslut[1];
    print BANK "insDoc(aux2,gLnk(2,\"$beslut[0]  \; <font size=
       -1><i>$datum_beslut</i>\",\"javascript:Open$beslut[2]()\"))\n";
   }
}  #* Projekt slut

#** Alla beslut ***
print BANK "aux1 = insFld(foldersTree, gFld(\"Alla beslut\", \"\"))\n";

#************ Hämtar alla beslut ***
$beslut_query = "select titel,datum,kod from bank_kort order by datum";
$sth2 = $dbh2->prepare($beslut_query);
$rader2 = $sth2->execute;
#************

for ($ii = 0; $ii < $rader2; $ii++)
{
@beslut = $sth2->fetchrow_array;
$datum_beslut = fixa_datum $beslut[1];
print BANK "insDoc(aux1,gLnk(2,\"$beslut[0]  \; <font size=
       -1><i>$datum_beslut</i>\",\"javascript:Open$beslut[2]()\"))\n";

print SCRIPT <<_STOP_;
function Open$beslut[2](){
  url = '$visa_prg?num=$beslut[2]&funktion=bank';
  popUpWin = window.open(url,'PopUp','width=644,height=512');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
}
_STOP_
}

print "End";

close BANK;
close SCRIPT;

$dbh -> disconnect;
$dbh2 -> disconnect;

#****************** Subrutiner ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5";
  return $datum;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   sok.cgi
# Date:      7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out a list of the search-results either made by user
#            defined keywords or by keywords included within another decision.
#            The script also checks if the deadline date is within a week and
#            if so spice up the site with a blink feature.
#
# CGI-variables:
#            nyckelordframe, nyckelord, funktion, day, month, year, deadline,
#            sqlvariabel
#
# Stored in DB:
#            extra
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub fixa_datum;
sub tolka_formular;
sub felkontroll;
sub kontroll_datum;

#*********Databas koppling ****************
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
print "Content-Type: text/html\nPragma: no-cache\n\n";
tolka_formular;

#*Hämtar nyckelord från bank_kort**************
if ($form{funktion} eq 'bank'){

#*Hämtar ett svar ***
$nyckelord_query = "select nyckelord from bank_kort where kod =
$form{\"num\"}";
$sth = $dbh->prepare($nyckelord_query);
$rader = $sth->execute;
@nyckelord = $sth->fetchrow_array;
#************

#print"$nyckelord_query";
$nyckelord = @nyckelord[0];
$dubbelvisningid = $form{num};

$i=0;
@nyckelord_split = split ", ", $nyckelord;
foreach $ord (@nyckelord_split)
{
```

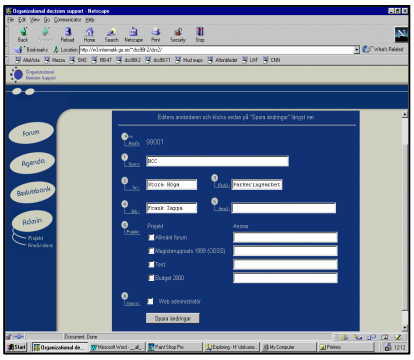
```
      if ($i < 1){
      $nyckelord = "$ord";
      } else {
      $nyckelord = "$nyckelord_$ord";
      }
$i++;
}
}
else
{
 $nyckelord = $form{nyckelordframe};
}
$dbh -> disconnect;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);


#*Tömmer fätet extra för tillfällig lagring av datumkontroll***
$datum_query = "update bank_kort set extra = '' ";
$sth = $dbh3->prepare($datum_query);
$rader = $sth->execute;
$dbh3 -> disconnect;

$tid = time;
$dateplus = localtime ($tid + (86400*5));
$dateminus = localtime ($tid - (86400*5));
$date = localtime;

$dbh3  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$datum_query = "update bank_kort set extra = 'true' where deadline <
'$dateplus' and deadline > '$date' or deadline > '$dateminus' and deadline <
'$date'";
#print"$datum_query";
$sth = $dbh3->prepare($datum_query);
$rader = $sth->execute;
$dbh3 -> disconnect;

$form{'deadline'} = "$form{'day'}/$form{'month'}/$form{'year'}";
#$form{'deadline'} = "31/12/1999";

#*Sök kontroll av vilka sökvägar som skall användas*******************
if ($form{'day'} eq '' and $form{'month'} eq '' and $form{'year'} eq ''){
}
else
{
 if ($form{'deadline'} eq "") {$form{'deadline'}= `date`;}
 else {kontroll_datum $form{'deadline'};}
}

if ($datumok eq 'true' and !$nyckelord eq ''){
$datumstatus= 'datum_nyckelord';}
elsif ($datumok eq 'true'){
$datumstatus= 'datum';
}
else {
$datumstatus= 'nyckelord';
}

#*Kontroll av vilen sqlvariabel som skall användas vid sökning med
datum***********
```

```
if ($form{sqlvariabel} eq 'eq'){
$sqlvariabel = 'like';
}
elsif ($form{sqlvariabel} eq '<'){
$sqlvariabel = '<';
}else{
$sqlvariabel = '>';
}

#***** Skriv ut toppen av html-sidan ***
print <<_TOP_;
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Organizational decision support</title>
</head>
<body background="bilder/bkgrnd2.gif">
<font face="times new roman" size="4" color="navy">S&ouml;kresultat:<br></font>
<!--font face="times new roman" size="6"
color="navy"><i>nyckelord:</i>$form{nyckelordframe}</font -->
<!--font face="times new roman" size="2" color="navy"><i>Datum:
$form{'year'}/$form{'month'}/$form{'day'}</i><br></font-->
_TOP_

print"<table border=0 cellpadding=0 cellspacing=0 width=400>";
print <<_MAIN_;
<tr>
<td valign=bottom ><font face="times new roman" size="2"
color="navy">Datum</FONT></td>
<td valign=bottom><font face="times new roman" size="2"
color="navy">Titel</FONT></A>
<td valign=bottom><font face="times new roman" size="2"
color="navy">Deadline</font></td>
</tr>
_MAIN_

if ($form{funktion} eq 'info'){
} else {

#****************Select-modul för nyckelord**************************
$nyckelord_titel      = "$nyckelord";
$nyckelord_beslutat   = "$nyckelord";
$nyckelord_baserat    = "$nyckelord";
$nyckelord_konsekvens = "$nyckelord";

#*******skapar str&auml;ng f&ouml;r field "titel"*************
@nyckelord_titel = split ",", $nyckelord_titel;
$i=0;
foreach $ord (@nyckelord_titel)
{
#$ord =~ s/ //g;
$ord = " '$ord'";
       if ($i < 1){
       $ord =~ s/ / titel ~* /ig;
       } else{
       $ord =~ s/ / or titel ~* /ig;
       }
$i++;
}
```

```
#*skapar sträg för field "beslutat"*************
@nyckelord_beslutat = split ",", $nyckelord_beslutat;
$i=0;
foreach $ord (@nyckelord_beslutat)
{
#$ord =~ s/ //g;
$ord = " '$ord'";
       if ($i < 1){
       $ord =~ s/ / beslutat ~* /ig;
       } else{
       $ord =~ s/ / or beslutat ~* /ig;
       }
$i++;
}

#*******skapar str&auml;ng f&ouml;r field "baseratpa"*************
@nyckelord_baserat = split ",", $nyckelord_baserat;
$i=0;
foreach $ord (@nyckelord_baserat)
{
#$ord =~ s/ //g;
$ord = " '$ord'";
       if ($i < 1){
       $ord =~ s/ / baserat ~* /ig;
       } else{
       $ord =~ s/ / or baserat ~* /ig;
       }
$i++;
}

#*skapar sträng för field "konsekvens"*************
@nyckelord_konsekvens = split ",", $nyckelord_konsekvens;
$i=0;
foreach $ord (@nyckelord_konsekvens)
{
#$ord =~ s/ //g;
$ord = " '$ord'";
       if ($i < 1){
       $ord =~ s/ / konsekvens ~* /ig;
       } else{
       $ord =~ s/ / or konsekvens ~* /ig;
       }
$i++;
}

#*hämtar sökresultat från korttabelen ********************
} #*** till (!form{funktion}) *****

if ($datumstatus eq 'nyckelord'){
$kort_query = "select * from bank_kort where @nyckelord_beslutat or
@nyckelord_titel or @nyckelord_baserat or @nyckelord_konsekvens";
} elsif ($datumstatus eq 'datum'){

$kort_query = "select * from bank_kort where datum $sqlvariabel
'$form{'deadline'}' order by datum";
} else {
```

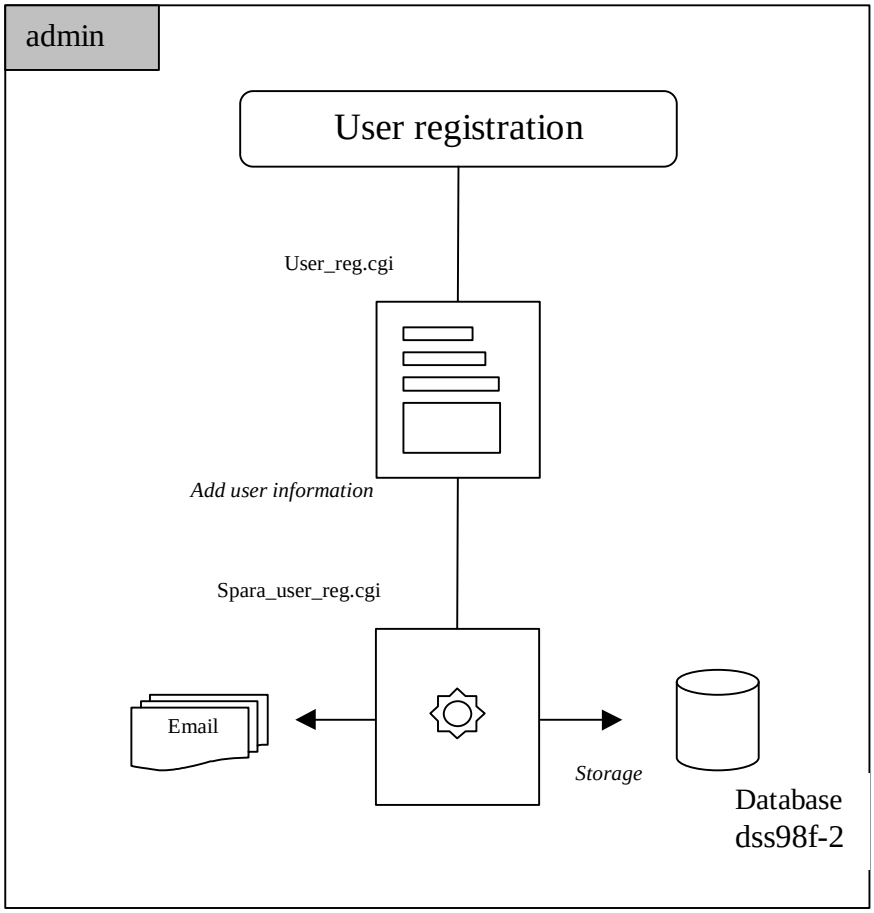
```
$kort_query = "select * from bank_kort where @nyckelord_beslutat or
@nyckelord_titel or @nyckelord_baserat or @nyckelord_konsekvens order by
datum";

#$kort_query = "select * from bank_kort where datum $sqlvariabel
'$form{'deadline'}' and @nyckelord_beslutat or
#datum $sqlvariabel '$form{'deadline'}' and @nyckelord_titel or datum
$sqlvariabel '$form{'deadline'}' and @nyckelord_baserat or
#datum $sqlvariabel '$form{'deadline'}' and @nyckelord_konsekvens ";
#*****************
}

if ($form{funktion} eq 'info'){
$kort_query = "select * from bank_kort where proj_kod = $form{num} order by
datum";
}

$sth = $dbh2->prepare($kort_query);
$rader = $sth->execute;
#************
#print"$kort_query";

for ($i = 0; $i < $rader; $i++)
{
@kort = $sth->fetchrow_array;
$datum1 = fixa_datum $kort[2];
$datum2 =  fixa_datum $kort[8];
$blink = "";
if ($kort[13] eq 'true' ){
$blink = "<blink>";
}else{
$blink = "";
}

if ($kort[0] eq $dubbelvisningid){
} else {
print <<_MAIN_;
<tr>
<td valign=bottom><font face="times new roman" size="2"
color="navy"><i>$datum1</i></FONT></td>
<td valign=bottom><font face="times new roman" size="2" color="navy"><a
href="../forum/list_beslutskort.cgi?num=$kort[0]"
target="top">$kort[3]</FONT></A>
<td valign=bottom><font face="times new roman" size="2"
color="navy">$blink$datum2</font></td>
</tr>
_MAIN_
}
}
print <<_BOTTOM_;
</table>
</body>
</html>
_BOTTOM_

$dbh -> disconnect;
$dbh2 -> disconnect;

#****************** Subrutiner ***
```

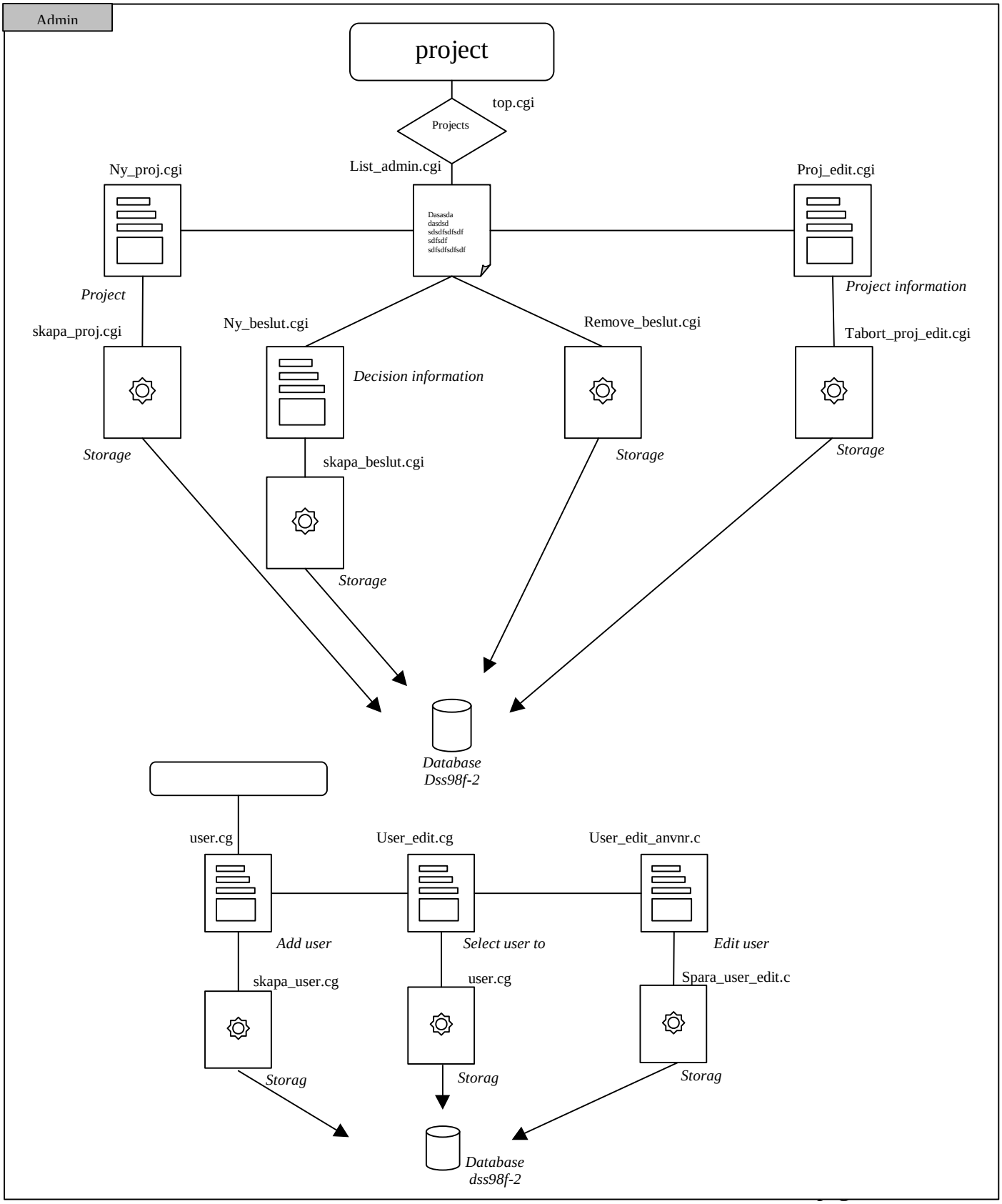
```
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}
#***** Datum kontroll ***
sub kontroll_datum
{
   my $dat = $_[0];
   my $d, $m, $y;

if ($dat !~ m/^(\d{1,2})\/(\d{1,2})\/(\d{4})$/) { felkontroll "datum format"; }
else {$datumok = 'true';}
$d = $1;
$m = $2;
$y = $3;
if ($d <1    || $d >31  ) { felkontroll "datum: dag"; }
if ($m <1    || $m >12  ) { felkontroll "datum: m&aring;nad"; }
if ($y <1999 || $y >2040) { felkontroll "datum: &aring;r"; }
#** Ändra till amerikansk datum
$form{'deadline'} = "$m/$d/$y";
}

#***** Felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning &auml;r ej korrekt, var god &auml;ndra $typ!";
   die;
}
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5";
  return $datum;
}
```



Admin

The final subsystem in the ODSS, - the administration subsystem is used in order to facilitate the ongoing use of the other subsystems and, to some degree, manage and direct the use of the system, for example, by the use of creation and deletion of projects.The decision cards, which store decision information in the decision bank can be created in the administration subsystem if the user of the administration system has access to that area. Finally, it is possible to add/edit and delete users of the other subsystems in the administration subsystem.





Jörgen Fredman, Mathias Horndahl, Lars Tong Strömberg

```
#!/usr/bin/perl

###############################################################################
# Program:    list_admin.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Prints out a list of current discussions within a specified
#             project, in order to choose either to make a decision based on the
#             discussion or to remove the discussion without creating a
#             decision.
#
# CGI-variables:    num
#
###############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub fixa_datum;
sub tolka_formular;
sub felkontroll;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#****************** Huvudprogram ***
tolka_formular;
print "Content-Type: text/html\nPragma: no-cache\n\n";

#************ Hämtar en ide ***
$test_query = "select * from proj where proj_kod=$form{\"num\"}";
$sth = $dbh->prepare($test_query);
$t_rader = $sth->execute;
@test = $sth->fetchrow_array;
#************

#***** Felkontroller ***
#if ($form{'num'} eq "" || $test[0] eq "")   {felkontroll "projekt";}

print <<_TOP_;
<html>
<head>
<title>Organizational decision support</title>
<! ett script för att få upp ett pop-upfönster för att välja vilka
prenumeration man vill göra >
</head>
<body background=bilder/bkgrnd2.gif>

<center>
<font face=helvetica size=2 color=silver><a href=../admin/ny_proj.cgi
target=main>[Lägg till nytt projekt]</a>  
<a href=../admin/proj_edit.cgi target=main>[Ta bort projekt]</a>
</font></center>
</body>
<body background=bilder/bkgrnd2.gif alink=teal link=silver vlink=teal >
<br>
```

```
<table border=0  cellspacing=0 cellpadding=0 align=center valign=TOP
background=bilder/bkgrnd22.gif nowrap>
<tr>
<td>

      <table border=0 align=left cellspacing=0 cellpadding=0  valign=top
      width=585 background=bilder/bkgrnd22.gif>
            <tr>
            <td width=12 height=25 align=left valign=top ><img
            src=bilder/corner1.gif width=12 height=11 hspace=0 vspace=0
            border=0 align=left alt=></td>
            <td width=100% align=center valign=bottom >
            <font face=helvetica size=3 color=silver><b>Skapa
            Beslut</b></font></td>
            <td width=12 align=right valign=top ><img src=bilder/corner2.gif
            width=11 height=12 hspace=0 vspace=0 border=0 align=right
            alt=></td>
            </tr>
<tr>
<td width=12 align=left valign=bottom  ></td>
<td width=100% align=left valign=bottom > </td>
<td width=12 align=right valign=bottom  height=20> </td>
</tr>
<tr>

_TOP_

#************ Hämtar en ide ***
$ide_query = "select * from forum_ide where proj_kod=$form{\"num\"}";
$sth = $dbh->prepare($ide_query);
$rader = $sth->execute;
#************

for ($i = 0; $i < $rader; $i++)
{
 @ide = $sth->fetchrow_array;
 $ide_num = $ide[0]; fixa_datum $ide[3]; $ide_datum = $datum; $ide_titel =
       $ide[1];
 $ide_signatur = $ide[2];

#************ Räknar antalet svar till en ide ***
 $antal_svar_query = "select count(*) from forum_svar where ide_kod = $ide[0]";
 $sth2 = $dbh2->prepare($antal_svar_query);
 $rader2 = $sth2->execute;
 @antal_svr = $sth2->fetchrow_array;
#************
 $antal_svar = $antal_svr[0];

#if($antal_svar>0)
#{
#************ Hämtar svar till denna ide ***
$svar_query = "select * from forum_svar where ide_kod = $ide[0] order by kod
desc";
$sth2 = $dbh2->prepare($svar_query);
$rader2 = $sth2->execute;
@svar = $sth2->fetchrow_array;
#************
$svar_num = $svar[0]; fixa_datum $svar[3]; $svar_datum = $datum;
#}
```

```
#*****

 if ($color eq "#ffffff"){$color = "#E8EAE9";}else {$color = "#ffffff";}
 print <<_STOP_;
 <!--      NY STROEM    -->
 <tr>
 <td  width=12 align=left valign=bottom  height=20> </td>
 <td width=100% align=left valign=top >
 <form action="#"  METHOD="POST" >
             <table border=0 valign=top align=left cellspacing=0 cellpadding=0
             valign=top background=bilder/bkgrnd22.gif>
             <tr >
             <td valign=top align=left><A
             HREF="remove_beslut.cgi?ide_kod=$ide_num&status=delete&proj_kod=$f
             orm{num}"> <img src=bilder/44_1.gif alt="Radera beslut utan att
             spara" border=0 align=left></A> </td>
             <td valign=bottom > <font face=helvetica size=2
             color=silver><i>$ide_datum</i></font></td>
             <td > </td>
             <td  valign=bottom  nowrap width=270 ><font face=helvetica size=2
             color=silver><b><A
             href=\"../script/frame.cgi?funktion=forum_disk&sida=show_ide.cgi?n
             um%3D$ide_num&ide=$ide_num\"  target=\"right\">
             $ide_titel</b></font></A></td>
             <td nowrap align=right  valign=bottom ><font face=helvetica size=2
             color=silver>  [$ide_signatur]</font></td>
      </tr>
    </form>
 _STOP_

 if($antal_svar>0)
 {
 print <<_STOP_;
 <form action="ny_beslut.cgi"  METHOD="POST" >
 <input type=hidden name=ide_kod value=$ide_num>
      <tr >
             <td height=30 valign=bottom >
             <INPUT type=submit value="Beslut">
             </td>
             <td align=center nowrap width=150 ><img src=bilder/closeup.gif
             width=11 height=11 alt= border=0><font face=helvetica color=silver
             size=1><i>$svar_datum</i></font></td>
             <td valign=middle > </td>
             <td colspan=2 valign=middle ><font face=helvetica size=2
             face=helvetica color=silver><A
             href="../script/frame.cgi?funktion=forum_disk&sida=show_svar.cgi?n
             um%3D$svar_num&ide=$ide_num" target=\"right\">
             Senaste svar</A>     Antal svar:
             $antal_svar</font></td>
      </tr>
 </table>
 </td>
 <td width=12 align=right valign=bottom  height=20> </td>
 <tr>
 </tr>
 <tr>
 <td width=12 align=left valign=bottom ></td>
 <td width=100% align=left valign=bottom ><hr></td>
 <td width=12 align=right valign=bottom  height=20> </td>
```

```
 </tr>
 <!--     SLUT STROEM    -->
 </form>
 _STOP_
}
else
{
 print <<_STOP_;
 <form action="ny_beslut.cgi"  METHOD="POST" >
 <input type=hidden name=ide_kod value=$ide_num>
       <tr>
             <td height=30 valign=bottom >
             <INPUT type=submit value="Beslut">
             </td>
             <td align=center nowrap width=150 > </td>
             <td valign=middle > </td>
             <td colspan=2 align=right valign=middle >
             </td>
       </tr>
       </table>
 </td>
 <td width=12 align=right valign=bottom  height=20> </td>
 <tr>
 </tr>
 <tr>
 <td width=12 align=left valign=bottom  ></td>
 <td width=100% align=left valign=bottom ><hr></td>
 <td width=12 align=right valign=bottom  height=20> </td>
 </tr>
 <!--     SLUT STROEM    -->
 </form>
 _STOP_
 }
}

print <<_STOP_;
<tr>
<td width=12 align=left valign=bottom ><img src=bilder/corner3.gif width=12
height=11 hspace=0 vspace=0 border=0 align=left alt=></td>
<td width=100% align=left valign=bottom > </td>
<td width=12 align=right valign=bottom ><img src=bilder/corner4.gif width=11
height=12 hspace=0 vspace=0 border=0 align=right alt=></td>
</tr>
</table>
</td>
</tr>
</table>
</body>
</html>
_STOP_
#******
$dbh -> disconnect;
$dbh2 -> disconnect;

#****************** Subrutiner ***
sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
```

```
  $datum = "$2  $3  $5  $4";
  return $datum;
}

sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}

#***** Felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   ny_beslut.cgi
# Date:      7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out an input-form for creating a decision from a
#            discussion.
#
# CGI-variables:
#            ide_kod
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$datum = `date '+%d/%m-%y'`;

#****************** Huvudprogram ***
tolka_formular;
$ide_kod = $form{'ide_kod'};

#************ Tar fram förifyllda fält för beslutet ***
$ide_query = "select * from forum_ide where kod=$ide_kod";
$sth = $dbh->prepare($ide_query);
$rader = $sth->execute;
@ide = $sth->fetchrow_array;
$titel=$ide[1]; $baserat=$ide[4]; $proj_kod=$ide[8]; $nyckelord=$ide[6];
$baserat =~ s/<BR>/\n/gs;  #** <BR> till radmatningar
$dbh  -> disconnect;

print "Content-Type: text/html\n\n";
print<<_BESLUTSKORT_HEADER_;
<html>
<head>
<title>Organizational decision support</title>
</head>
<body background=../bilder/bkgrnd2.gif>
<FORM METHOD=POST ENCTYPE="multipart/form-data" action="skapa_beslut.cgi">
<input type=HIDDEN name=proj_kod value=$proj_kod>
<input type=HIDDEN name=ide_kod value=$ide_kod>
<input type=HIDDEN name=nyckelord value="$nyckelord">
_BESLUTSKORT_HEADER_

print<<_BESLUTSKORT_MAIN_;
<table width=223 border="1" cellpadding="0" align="center" valign="TOP"
background="bkgrnd2.gif" >
<tr>
<td>
      <table nowrap  border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  background="bilder/bkgrnd22.gif">
      <tr>
```

```
<td width="12" height="20" align="left" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="center" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/icocard.gif" width=16
height=16 hspace=0 vspace=2 border=0 align="left" alt=""><img
src="bilder/txtbeslutskort.gif" width=95 height=21 hspace=0 vspace=0
border=0 align="middle" alt=""><br><br>
</td>
<td width="12" align="right" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<!-- Beslutskort header start. variabler: titel, datum  -->
<table border="0" nowrap align="right" cellspacing="0" cellpadding="2"
valign="top" background="bilder/bkgrnd22.gif">
       <tr>
       <td width="42" height="15" align="right" valign="middle"
       background="bilder/bkgrnd22.gif" ><font face="times new roman"
       size="2" color="white">Titel:</font></td>
       <td nowrap width="350" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><input type="Text" size="34"
       name="titel" align="LEFT" VALUE=\"$titel\"></td>
       <td width="100%" align="right" valign="middle"
       background="bilder/bkgrnd22.gif"><font face="times new roman"
       size="2" color="white"></font></td>
       <td  nowrap width="70" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       </tr>
       <tr>
       <td width="42" height="15" align="Right" valign="middle"
       background="bilder/bkgrnd22.gif" ><font face="times new roman"
       size="2" color="white">Datum:</font></td>
       <td nowrap width="350" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><input type=HIDDEN name=datum
       value=$datum><font face="times new roman" size="2"
       color="white">$datum</td>
       <td width="100%" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       <td  nowrap width="70" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
</table>
</td>
<td width="12" align="right" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<hr width="495"  align="Center">
</td>
```

```
<td width="12" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
</tr>
<!-- Beslutskort header slut -->
<!-- Beslutskort huvud start. variabler: baseratpa, beslutat,
berordaparter, konsekvens -->
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<table border="0" nowrap align="left" cellspacing="0" cellpadding="3"
valign="top" background="bilder/bkgrnd22.gif">
<tr>
<td nowrap width="250" height="65" align="left" valign="top"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Baserat p&aring;:<br></font>
<textarea name="baseratpa" cols="27" rows="4" >$baserat</textarea>
</td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
color="white">Beslutat:<br></font>
<textarea name="beslutat" cols="27" rows="4" ></textarea>
</td>
</tr>
<tr>
<td nowrap width="250" height="65" align="left" valign="top"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Ber&ouml;rda parter:<br></font>
<textarea name="berordaparter" cols="27" rows="4"></textarea>
</td>
<td nowrap width="250" align="left" valign="top"
background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
color="white">Konsekvens:<br></font>
<textarea name="konsekvens" cols="27" rows="4" ></textarea>
</td>
</tr>
</table>
<!-- Beslutskort huvud slut -->
</td>
<td width="12" align="right" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<!-- Beslutskort attachmnet. Variabler: deadline, filnamn -->
<table border="0"  align="left" cellspacing="0" cellpadding="1"
valign="top" background="bilder/bkgrnd22.gif">
<tr>
<td nowrap width="250" height="5" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
color="white">Deadline:</font><br>
<font face="Times New Roman" size="2" color="Silver">
<input type="Text" name="year" align="LEFT" size="4"> / <input
type="Text" name="month" align="LEFT" size="2"> / <input
type="Text" name="day" align="LEFT" size="2"> (1999/12/31)</font>
```

```
      </td>
      <td nowrap width="250" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><font face="times new roman" size="2"
      color="white">Bifogat:</font><br>
      <font face="Times New Roman" size="2" color="Silver"><input  type="file"
      name="filnamn" align="LEFT" size="15"></font>
      </td>
      <!-- nytt attachment -->
      </tr>
      <tr>
      <td nowrap width="250" height="5" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" ><font face="times new roman" size="2"
      color="white">ansvaras av email:</font><br>
      <font face="Times New Roman" size="2" color="Silver">
      <input type="Text" name="ansvarig_email" align="LEFT" size="29"></font>
      </td>
      <td nowrap width="250" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><br>
      <font face="Times New Roman" size="2" color="Silver"></font>
      </td>
      <!-- nytt attachment -->
      </tr>
      </table>
      <!-- Beslutskort attachmnet slut -->

      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <hr width="495"  align="Center">
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><div align="center"><input type="Submit"
      value="Spara beslut">  <input type="Reset"
      value=Rensa></div><br></td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      </table>
      </td>
      </tr>
      </table>
</form>
</body>
</html>
_BESLUTSKORT_MAIN_
```

```
#****************** Subrutiner ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}

sub fixa_datum
{
  my $d = $_[0];
  $d =~ m/(\w+) (\w+) (\d+) (\w.:\w.:\w.) (\d+)/;
  $datum = "$2  $3  $5  $4";
  return $datum;
}
```

```
#!/usr/bin/perl

################################################################################
# Program:    ny_proj.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             The script prints out a form in order to create a new project. The
#             new project assigns a unique identificationnumber based on the
#             last number stored in the database.
#
# CGI-variables:    num
#
################################################################################

#********* Initiera subrutiner och variabler **
sub tolka_formular;
use DBI;
tolka_formular;

#********* Huvud program ***********
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$proj_kod   = $form{'num'};
$datum = localtime;

#************** Hämtar sista projektkoden ********************
$proj_query = "select * from proj";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
#************
for ($i = 0; $i < $rader; $i++)
{
 @proj = $sth->fetchrow_array;
 $projektid = $proj[0];
}
$projektid = $projektid + 1;

print <<_STOP_;
Content-Type: text/html

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
<head>
<title>Organizational decision support</title>
<script language="JavaScript">
<!--
function PopUp(Anchor){
  url = "popup1.html#" + Anchor
  popUpWin =
window.open(url,'PopUp','width=250,height=280,menubar=no,scrollbars=yes,toolbar
=no,location=no,status=no,resizable=no');
  popUpWin.location.href = url;
  if (!popUpWin.opener) popUpWin.opener = self;
  popUpWin.focus();
}
// -->
```

```
</script>
</head>

<body background="bilder/bkgrnd2.gif" ><br><br>
<FORM METHOD=POST action="skapa_proj.cgi">
<input type=HIDDEN name=proj_kod value=$proj_kod>
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr>
      <td>

      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  width=485 background="bilder/bkgrnd2.gif">
      <tr>
      <td width="12" height="25" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif"><font face=helvetica size=3
      color=silver>Skapa nytt projekt:</font></td>
      <td width="12" align="right" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <table border="0" align="left" cellspacing="0" cellpadding="5"
      valign="top" background="bilder/bkgrnd2.gif">
      <tr>
      <td width="42" height="40" align="left" valign="middle"
      background="bilder/bkgrnd22.gif"><font face=helvetica size=2
      color=silver>Projektkod:</font></td>
      <td width="100%" align="left" valign="middle"
      background="bilder/bkgrnd22.gif"><font face=helvetica size=3
      color=silver>$projektid</font></td>
      <td width="42" align="right" valign="middle"
      background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
      onClick="PopUp('Rubrik')"></td>
      </tr>
      <tr>
      <td width="42" height="40" align="right" valign="middle"
      background="bilder/bkgrnd22.gif"><font face=helvetica size=2
      color=silver>Datum:</font></td>
      <td width="100%" align="left" valign="middle"
      background="bilder/bkgrnd22.gif"><font face=helvetica size=3
      color=silver>$datum</font></td>
      <td width="42" align="right" valign="middle"
      background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
      onClick="PopUp('Email')"></td>
```

```
	<tr>
	<td width="42" height="40" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"><img src="bilder/fomr_anv_1.gif"
	hspace=0 vspace=0 border=0 align="right" alt=""></td>
	<td width="100%" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"><INPUT TYPE=text NAME=titel
	SIZE="45"></td>
	<td width="42" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
	onClick="PopUp('Namn')"></td>
	</tr>
	<tr>
	<td width="42" height="40" align="right" valign="top"
	background="bilder/bkgrnd22.gif"><font face=helvetica size=2
	color=silver>Info:</font></td>
	<td width="100%" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"><textarea name=info rows=5
	cols=44></textarea></td>
	<td width="42" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"></td>
	</tr>
	<tr>
	<td width="42" height="40" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"><img src="bilder/fomr_anv_2.gif"
	hspace=0 vspace=0 border=0 align="right" alt=""></td>
	<td width="100%" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"><input  type=submit value="Skapa"></td>
	<td width="42" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"><a href="javascript:void(0)"
	onClick="PopUp('Posta')"></td>
	</tr>
	</table>
	</td>
	<td width="12" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif" height="20"> </td>
	<tr>
	<td width="12" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
	height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
	<td width="100%" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"> </td>
	<td width="12" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
	height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
	</tr>
	</table>
</td>
</tr>
</table>
</form>
</body>
</html>
_STOP_

#****************** Subrutiner ***
sub tolka_formular
{
	my ($buffer, @par, $i);
	$buffer ="";
```

```
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   proj_edit.cgi
# Datum:     7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Creates an array of those projects that are deletable in the
#            database.
#
##############################################################################

#** Filnamn och variabler **
use DBI;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$agendaprg = "";

#******** Skriv ut ändrings formuläret *****************
print "Content-Type: text/html\nPragma: no-cache\n\n";
print"<body background=../bilder/bkgrnd2.gif >";
print"<center><a href=user.cgi> [Tillbaka]</a>";

print <<_HTML_;
<FORM ACTION="tabort_proj_edit.cgi" METHOD="POST">
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr>
      <td>
      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  width=601 background="bilder/bkgrnd2.gif">
      <tr>
      <td width="46" height="25" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="12" align="right" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20">
      <font face=helvetica size=2 face=helvetica color=silver>
      Markera de projekt du vill ta bort.
      </font><br><hr> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
```

```
      <table border="0" align="left" cellspacing="0" cellpadding="2"
      valign="top" background="bilder/bkgrnd2.gif">
      <tr>
      <td width="72" height="20" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>projektNr</font>
      </td>
      <td width="90" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>Titel</font>
      </td>
      <td nowrap width="160" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver></font>
      </td>
      <td nowrap width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver></font>
      </tr>
_HTML_

print"</body><br>";
print"<body background=../bilder/bkgrnd2.gif alink=teal link=silver
vlink=teal>";

#************ Hämtar meddelanden ***
$proj_query = "select * from proj order by Proj_kod'";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
for ($i = 0; $i < $rader; $i++)
{
 @proj = $sth->fetchrow_array;
 print <<_HTML_;
      <tr>
      <td width="72" height="20" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica
      color=silver><i>$proj[0]</i></a></font>
      </td>
      <td width="50"  align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica
      color=silver>$proj[2]</a></font>
      </td>
      <td nowrap width="42" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver></font>
      </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
         <INPUT TYPE="checkbox" NAME="proj"
      VALUE="$proj[0]"></td>
      </tr>
 _HTML_
}
$dbh -> disconnect;

print <<_HTML_;
      <tr>
```

```
      <td width="72" height="20" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
       
      </td>
      <td width="200" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <br><INPUT TYPE=submit VALUE="Ta bort projekt">
      </td>
      <td width="42" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif"> 
      </td>
      <td width="100%" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      </tr>
      </table>
      </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      </table>
      </td>
      </tr>
      </table>
</form>
</body>
</html>
_HTML_
```

```
#!/usr/bin/perl

##############################################################################
# Program:    remove_beslut.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Remove the specified discussion without saving any decision into
#             the database.
#
# CGI-variables:
#             proj_kod, ide_kod
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub fixa_datum;
sub tolka_formular;
sub felkontroll;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$ENV{'PATH'} = '/bin:/usr/bin:/usr/local/bin';
$filkatalog = "beslut_filer";

#****************** Huvudprogram ***
tolka_formular;
print "Content-Type: text/html\nPragma: no-cache\n\n";
print "<body background=bilder/bkgrnd2.gif>";

#********** Radera ide + svar från forum ********
$rv = $dbh3->do("delete from forum_ide  where kod=$form{ide_kod};");
if ($rv > 0)
 { print "<BR><H2><CENTER>Ide raderade<BR></H2>";}
else
 { print "<BR><H2><CENTER>Ide kunde inte raderas!<BR></H2>"; }

$rv = $dbh3->do("delete from forum_svar where ide_kod=$form{ide_kod};");
if ($rv > 0)
 { print "<BR><H2><CENTER>Svar raderade<BR></H2>";}
else
 { print "<BR><H2><CENTER>Svar kunde inte raderas!<BR></H2>"; }

$rv = $dbh3->do("delete from forum_prem where ide = $form{ide_kod}");
print "status: $rv";
if ($rv > 0)
 { print "<BR><H2><CENTER>prenumerationer raderade<BR></H2>";}
else
 { print "<BR><H2><CENTER>prenumerationer kunde inte raderas!<BR></H2>"; }

#************ Tar bort attachment ***
$attach_query = "select path, slump_namn from forum_attach where
ide_kod=$form{ide_kod};";
$sth3 = $dbh3->prepare($attach_query);
$rader = $sth3->execute;
```

```
for ($i = 0; $i < $rader; $i++)
{
 @attach = $sth3->fetchrow_array;
 open (RADERA_FIL, ">../forum/$attach[0]/$attach[1]");
 print "Raderas: ../forum/$attach[0]/$attach[1]<BR>";
 print RADERA_FIL "";
 close RADERA_FIL;
}

$rv = $dbh3->do("delete from forum_attach where ide_kod=$form{ide_kod};");
if ($rv > 0)
{
 print "<BR><H2><CENTER>Attachment raderade<BR></H2><BR>\
 <a href=\"list_admin.cgi?num=$form{proj_kod}\" target=main><< Åter till
admin</a>";
}
else
{
 print "<BR><H2><CENTER>Attachment kunde inte raderas!<BR></H2><BR>\
 <a href=\"list_admin.cgi?num=$form{proj_kod}\" target=main><< Åter till
admin</a>";
}

$dbh  -> disconnect;
$dbh2 -> disconnect;
$dbh3 -> disconnect;

#****************** Subrutiner ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}


#***** Felkontroll ***
sub felkontroll
{
```

```
   my $typ = $_[0];
   print "Din inmatning &auml;r ej korrekt, var god &auml;ndra $typ!";
   die;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    skapa_beslut.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Creates a new decision from the specific discussion and puts this
#             as a new record in the bank_kort table. It also removes all other
#             information regarding this specific discussion. The new decision
#             assigns an unique identificationnumber based on the last number
#             stored in the database.
#
# CGI-variables:
#             titel, Date, baseratpa, beslutat, berordaparter, deadline,
#             ansvarig_email, konsekvens, proj_kod, ide_kod, nyckelord, day,
#             month, year
#
# Stored in DB:
#             kod, titel, nyckelord, filkod, avslut, filnamn, path, proj_kod,
#             baseratpa, beslutat, berordaparter, konsekvens
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
use LWP::Simple;
sub tolka_multipart;
sub slumpstrang;
sub ladda_upp_fil;
sub lagra_attachment;
sub felkontroll;
sub koda_till_mac;
sub kontroll_datum;
sub agenda_deadline;

$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3 = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$deadline_adress   = "http://system:gborgborgo\@w3.informatik.gu.se/~dss98f
                     -2/dss2/agenda/add.cgi";
$ENV{'PATH'} = '/bin:/usr/bin:/usr/local/bin';
$filkatalog = "../beslutsbank/beslut_filer";

#****************** Huvudprogram ***
print "Content-Type: text/html\n\n";
print "<body background=bilder/bkgrnd2.gif >";
srand;
tolka_multipart;
if ($form{'day'} || $form{'month'} || $form{'year'})
{
 $form{'deadline'} = "$form{'day'}/$form{'month'}/$form{'year'}";
}
```

```
#***** Felkontroller ***
if ($form{'ansvarig_email'} =~ m/@.+\.\w{2,3}$/ || $form{'ansvarig_email'} eq
""){$check = "ok";} else {felkontroll "epost";}
if ($form{'proj_kod'} eq "")     {felkontroll "projekt";}
if ($form{'titel'} eq "")        {felkontroll "titel";}
if ($form{'baseratpa'} eq "")    {felkontroll "baserat på";}
if ($form{'beslutat'} eq "")     {felkontroll "beslutat";}
if (!$form{'nyckelord'})         {$form{'nyckelord'} = ""}
if (!$form{'deadline'})     {$avslut="ja"; $form{'deadline'} = null;}
else {kontroll_datum $form{'deadline'}; $avslut="nej"; agenda_deadline;}
$form{'datum'} = `date`;
#***********************

#***** Koda om å,ä och ö ***
koda_till_mac ("titel","baseratpa","beslutat","barordaparter","konsekvens");

# Bryt ut filnamnet från sökvägen.
# Och ladda upp fil om det finns någon.
$fil_namn =~ m/([^\/\\:]*)$/;
$fil_namn = $1;
$fil_lst = `ls -l $form{'filnamn'}`;
$fil_lst =~ m/www\s+(\d+)/;
$storlek = $1;

if ($storlek>3)
{
   ladda_upp_fil;
   lagra_attachment;
}
else {$filkod = "null";}

# Skriv ut listan.
print <<_FOT_;
<BR>   titel: $form{'titel'}
<BR>   datum: $form{'datum'}
<BR>   Baserat på: $form{'baseratpa'}
<BR>   Beslutat: $form{'beslutat'}
<BR>   Berörda: $form{'berordaparter'}
<BR>   Deadline: $form{'deadline'}
<BR>   ansvarig email: $form{'ansvarig_email'}
<BR>   fil: $fil_namn
<BR>   storlek: $storlek bytes
<BR>   konsekvens: $form{'konsekvens'}
<BR>   end: $end
<BR>   projekt: $form{'proj_kod'}
<BR>   ide: $form{ide_kod}
<BR>   deadline: $deadline_adress
<BR>   Nyckelord: $form{'nyckelord'}
_FOT_

#************ Hämtar projekt-titel ***
$projekt_query = "select titel from proj where proj_kod = $form{'proj_kod'}";
$sth = $dbh->prepare($projekt_query);
$rader_p = $sth->execute;
@proj = $sth->fetchrow_array;
$titel = $proj[0];
```

```
#************ Tar fram högsta nummer bland beslut ***
$kod_query = "select max(kod) from bank_kort";
$sth = $dbh->prepare($kod_query);
$rader = $sth->execute;
@count = $sth->fetchrow_array;
$kod = $count[0]+1;

#************ Spara ny beslut i databasen ************
if ($avslut eq "ja")
{
$rv = $dbh->do("insert into bank_kort values
               ($kod,$form{proj_kod},'$form{'datum'}',
               '$form{'titel'}','$form{'baseratpa'}',
               '$form{'beslutat'}','$form{'berordaparter'}',
               '$form{'konsekvens'}',null,
                $filkod,'$avslut','$form{'ansvarig_email'}',
             '$proj[0]','','$form{'nyckelord'}');");
}
else
{
$rv = $dbh->do("insert into bank_kort values
               ($kod,$form{proj_kod},'$form{'datum'}',
               '$form{'titel'}','$form{'baseratpa'}',
               '$form{'beslutat'}','$form{'berordaparter'}',
               '$form{'konsekvens'}','$form{'deadline'}',
                $filkod,'$avslut','$form{'ansvarig_email'}',
               '$proj[0]','','$form{'nyckelord'}');");
}
if ($rv == 1)
{
 print "<BR><H2><CENTER>Uppdateringen utf&ouml;rd<BR></H2>";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej!!, var god f&ouml;rs&ouml;k
senare!<BR></H2>";
}

#********** Radera ide + svar från forum ********
$rv = $dbh3->do("delete from forum_ide  where kod=$form{ide_kod};");
if ($rv > 0)
 { print "<BR><H2><CENTER>Ide raderade<BR></H2>";}
else
 { print "<BR><H2><CENTER>Ide kunde inte raderas!<BR></H2>"; }

$rv = $dbh3->do("delete from forum_svar where ide_kod=$form{ide_kod};");
if ($rv > 0)
 { print "<BR><H2><CENTER>Svar raderade<BR></H2>";}
else
 { print "<BR><H2><CENTER>Svar kunde inte raderas!<BR></H2>"; }

$rv = $dbh3->do("delete from forum_prem where ide = $form{ide_kod}");
print "status: $rv";
if ($rv > 0)
 { print "<BR><H2><CENTER>prenumerationer raderade<BR></H2>";}
else
 { print "<BR><H2><CENTER>prenumerationer kunde inte raderas!<BR></H2>"; }

#************ Tar bort attachment ***
```

```
$attach_query = "select path, slump_namn from forum_attach where
ide_kod=$form{ide_kod};";
$sth3 = $dbh3->prepare($attach_query);
$rader = $sth3->execute;

for ($i = 0; $i < $rader; $i++)
{
 @attach = $sth3->fetchrow_array;
 open (RADERA_FIL, ">../forum/$attach[0]/$attach[1]");
 print "Raderas: ../forum/$attach[0]/$attach[1]<BR>";
 print RADERA_FIL "";
 close RADERA_FIL;
}

$rv = $dbh3->do("delete from forum_attach where ide_kod=$form{ide_kod};");
if ($rv > 0)
{
 print "<BR><H2><CENTER>Attachment raderade<BR></H2><BR>\
 <a href=\"../script/frame.cgi?funktion=admin&num=$form{'proj_kod'}\"
target=right>
 << Åter till admin</a>";}
else
{
 print "<BR><H2><CENTER>Attachment kunde inte raderas!<BR></H2><BR>\
 <a href=\"../script/frame.cgi?funktion=admin&num=$form{'proj_kod'}\"
target=right>
 << Åter till admin</a>";
}
$dbh  -> disconnect;
$dbh2 -> disconnect;
$dbh3 -> disconnect;

#****************** Subrutiner ***
#**** Sub Ladda fil *
sub ladda_upp_fil
{
       my ($faktiskt_namn, $K, $rad, $andelse);

       # Ge filen ett slumpmässigt namn
       do {$faktiskt_namn = int(rand 100000).".asis";}
              while -e "$filkatalog/$faktiskt_namn";

       $faktiskt_namn = "$fil_namn"._."$faktiskt_namn";
       $slump_namn = $faktiskt_namn;
       # Om ingen Content-Type har angetts, försök bestämma den
       # genom att titta på filändelsen.
       if (!$form{'fil','Content-Type'})
       {

              # Detta är den default Content-Type som används om
              # ingen lämplig hittas
              $form{'fil','Content-Type'} = 'application/x-unknown';

#             # Finn ändelsen
#             ($andelse) = $form{'fil','filnamn'} =~ /\.([^.]*)$/;
#
#             # Matcha ändelsen mot raderna i filen mime.types
#
#             open (MIME, "<mime.types") or die (print "kan ej öppna open: $!");
```

```
#             while ($rad = <MIME>)
#             {
#                         if ($rad =~ /^(.*?)\s.*\b$andelse\b/)
#                               {$form{'fil','Content-Type'} = $1;}
#             }
#             close MIME;
      }

      # Skriv ut en lämplig header till ASIS-filen
      open (ASIS, ">$filkatalog/$faktiskt_namn")
            or die "open: $!";
      print ASIS <<_HUVUD_;
Status: 200 OK
Content-Type: $form{'fil','Content-Type'}

_HUVUD_
      # Lägg till den temporära filens innehåll

      open (TEMP, "<$form{'filnamn'}") or die (print "kan ej öppna!!<P>");
      print ASIS $rad while $rad = <TEMP>;
      close TEMP;
        close ASIS;

      # Radera den temporära filen, vi behöver den inte mer
      unlink "$form{'filnamn'}";

      # Radera HTML-markörer från beskrivningen och det
      # önskade filnamnet.
      foreach $_ ($form{'beskrivning'}, $form{'filnamn'})
            {$_ =~ s/([<>])/$1 eq "<" ? "&lt;" : "&gt;"/ge}

      # Beräkna filstorleken i K
      $K = 1+int((-s "$filkatalog/$faktiskt_namn")/1024);
}

#********** Sub tolka multipart formulär *********
sub tolka_multipart
{
      # Om innehållstypen inte är multipart/form-data, anropa
      # den gamla tolka_formular-rutinen.
      if ($ENV{'CONTENT_TYPE'} !~ /^multipart\/form-data/)
      {
            tolka_formular;
            return;
      }

      my ($grans, $rad, $temp_fil, $index, $falttyp,
            $nasta_falttyp);

      # Extrahera gränssträngen
      ($grans) = $ENV{'CONTENT_TYPE'} =~ /boundary=(.*)/;

      $falttyp = "ingen";

      # Läs varje rad av data
      while ($rad = <STDIN>)
      {
            # Om vi förväntar oss att läsa ett dokumenthuvud
            if ($falttyp eq "huvud")
```

```
{
	# Om vi stöter på en tom rad, avsluta läsningen av
	# huvudet och börja läsa fältinnehållet
	if ($rad eq "\r\n")
		{$falttyp = $nasta_falttyp}

	# Matcha filfälthuvuden
	elsif ($rad =~ m{^Content-Disposition:\ ?form-
		data;\ ?name="(.*?)";\ ?filename="(.*?)"}ix)
	{
		# Sätt $index till fältnamnet
		$index = $1;
		$form{$index} = "";

		# Filnamnet
		$fil_namn = $2;

		# Spara sökvägen
		$form{$index, "sokvag"} = $3;

		# Spara filnamnet som den räcka av tecken som
		# följer det sista / \ eller : i strängen.
		# (Inte nödvändigtvis korrekt, men en hygglig
		# gissning.)
		($form{$index, "filnamn"}) =
			$3 =~ m{([^/\\:]*)$};

		# Skapa en temporär fil och se till att den
		# inte redan existerar.
		do {$temp_fil = "/tmp/$$-".int(rand 1000000)}
			while (-e $temp_fil);

		# Öppna den temporära filen.
		open (TEMP_FIL, ">$temp_fil")
			or die "open: $!";

		# Lagra sökvägen till filen som en post i
		# %form.

		$form{$index} = $temp_fil;

		# Efter huvudet läser vi filinnehållet
		$nasta_falttyp = "fil";
	}

	# Matcha vanliga formulärfälthuvuden
	elsif ($rad =~ m{^Content-Disposition:\ ?form-
		data;\ ?name="(.*?)"}ix)
	{
		# Sätt $index till fältnamnet
		$index = $1; $form{$index} = "";

		# Efter huvudet läser vi fältet
		$nasta_falttyp = 'fält';
	}

	# Matcha Content-Type-huvud och  spara värdet
	elsif ($rad =~ /^Content-Type: ?(.*)\r\n/i)
		{$form{$index, "Content-Type"} = $1;}
```

```
		}

		# Om datat var en gränssträng
		elsif ($rad =~ /^--$grans(--)?\r\n/)
		{
			# Avsluta inmatningen av föregående fält
			if ($falttyp eq "fil")
			{
				# Om föregående fält var ett filfält, trunkera
				# två tecken från filen (för att ta bort \r\n)
				close TEMP_FIL;
				truncate $form{'fil'}, (-s $form{'fil'})-2;
			}
			# Trunkera avslutande \r\n från formulärfält
			elsif ($falttyp eq "fält")
				{$form{$index} =~ s/\r\n$//;}

			# Avsluta inläsningen om slutmarkören nås.
			last if $rad eq "--$grans--\r\n";

			# Sätt fälttyp till huvud eftersom det nästa vi
			# förväntar att läsa oss är ett dokumenthuvud.
			$falttyp = 'huvud';
		}

		# Vanliga rader (de som inte är gränssträngar eller
		# huvuden) behandlas här
		elsif ($falttyp eq "fil")
			{print TEMP_FIL $rad;}
		elsif ($falttyp eq "fält")
				{$form{$index}.=$rad;}
	}
}

#******** Sub slumpsträng ***********
sub slumpstrang
{
	my ($typ, $langd) = @_;
	my ($strang, $i, $tecken) = ("");

	# Loopa för varje tecken i strängen
	for ($i=0; $i<$langd; $i++)
	{
		# Om typen är"numerisk" generera ett tal
		# mellan 0-9
		if ($typ eq 'numerisk')
			{$tecken = int(rand(10)) + ord('0');}
		# Om typen är "alfabetisk" generera ett tecken
		# ur något av intervallen 0-9, a-z, A-Z
		elsif ($typ eq 'alfabetisk')
		{
			$tecken = int(rand(62)) + ord('0');
			$tecken += ord('A') - ord('9') - 1
				if $tecken>ord('9');
			$tecken += ord('a') - ord('Z') - 1
				if $tecken>ord('Z');
		}
		# Annars - generera ett godtyckligt tecken
		else
```

```
                    {$tecken = int(rand(256));}

                # Lägg tecknet till strängen
                $strang .= chr($tecken);
        }
        $strang;
}

#******** Attachment ***********
sub lagra_attachment
{
 #************ Tar fram högsta nummer bland filer ***
 $filkod_query = "select max(filkod) from bank_attach";
 $sth2 = $dbh2->prepare($filkod_query);
 $rader2 = $sth2->execute;
 @count2 = $sth2->fetchrow_array;
 $filkod = $count2[0]+1;
 #************ Spara ny ide i databasen ************
 $rv2 = $dbh2->do("insert into bank_attach values
              ($filkod,'$fil_namn','$filkatalog','$slump_namn');");
 if ($rv2 == 1)
 {
  print "<BR><H2><CENTER>Attachment sparat.<BR></H2>";
 }
 else
 {
  print "<BR><H2><CENTER>Databasen svarar ej (attach), var god
  f&ouml;rs&ouml;k senare!<BR></H2>";
 }
}

#***** Felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}

#********** Sub koda_till_mac **********
sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'","/");
     my @mac    =

("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;","&acute\;","&#47
\;");
     my $i,$x;

for($i=0;$i<=$#matcha;$i++)
  {
   $form{"$matcha[$i]"} =~ s/\\/&#92\;/gs;
   for($x=0;$x<=$#tkn;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;
    }
  }
}
```

```
#***** Datum kontroll ***
sub kontroll_datum
{
   my $dat = $_[0];

if ($dat !~ m/^(\d{1,2})\/(\d{1,2})\/(\d{4})$/) { felkontroll "datum format"; }
$d = $1;
$m = $2;
$y = $3;

$d =~ s/^0//;
$m =~ s/^0//;

if ($d <1    || $d >31  ) { felkontroll "datum: dag"; }
if ($m <1    || $m >12  ) { felkontroll "datum: månad"; }
if ($y <1999 || $y >2040) { felkontroll "datum: år"; }

#** Ändra till amerikansk datum
$form{'deadline'} = "$m/$d/$y";
}

#***** Lagrar deadline i agendan *****
sub agenda_deadline
{
 $deadline_adress =
"$deadline_adress"."?ar=$y&monad=$m&datum=$d&typ=100&projekt=$form{'proj_kod'}&
beskrivning=Deadline: $form{'titel'}";
 $getpage = get $deadline_adress;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   skapa_proj.cgi
# Date:            7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Creates a new project based on the information given in the form
#            and save this information as a new record in the database. The new
#            project assigns an unique identificationnumber based on the last
#            number stored in the database.
#
# CGI-variables:
#            titel, info
#
# Stored in DB:
#            projektid, Date, titel, info
#
##############################################################################

#********* Initiera subrutiner och variabler **
sub tolka_formular;
sub koda_till_mac;
use DBI;
tolka_formular;

print "Content-Type: text/html\n\n";
print"<body background=bilder/bkgrnd2.gif><br>";

#********* Huvud program ***********
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$datum = localtime;
koda_till_mac ("titel","info");

#************** Hämtar sista projektkoden ******************
$proj_query = "select * from proj";
$sth = $dbh->prepare($proj_query);
$rader = $sth->execute;
#************

for ($i = 0; $i < $rader; $i++)
{
 @proj = $sth->fetchrow_array;
 $projektid = $proj[0];
 $projekttitel = $proj[1];
}
if ($projekttitel eq $form{titel})
{
 print "<BR><H2><CENTER>Projektnamnet finns redan!<BR></H2>";
}
else
{
 $projektid = $projektid + 1;
 $dbh  -> disconnect;
 $dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
 #*********** Spara ny ide i databasen ************
```

```
 $rv = $dbh->do("insert into proj values
              ($projektid, '$datum', '$form{titel}', '$form{info}');");
 if ($rv == 1)
 {
  print "<BR><H2><CENTER>Uppdateringen utf&ouml;rd<BR></H2>";
  print"$form{titel}";
 }
 else
 {
  print "<BR><H2><CENTER>Databasen svarar ej!!, var god f&ouml;rs&ouml;k
   senare!<BR></H2>";
 }
}
$dbh  -> disconnect;

#****************** Subrutiner ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}

#********** Sub koda_till_mac **********
sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'","/");
     my @mac    = ("&aring\;","&Aring\;","&auml\;",
       "&Auml\;","&ouml\;","&Ouml\;","&acute\;","&#47\;");
     my $i,$x;
 for($i=0;$i<=$#matcha;$i++)
  {
   $form{"$matcha[$i]"} =~ s/\\/&#92\;/gs;
   for($x=0;$x<=$#tkn;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;
    }
  }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    skapa_user.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Creates a new user based on the information given in the input-
#             form and save this information as a new record in the database.
#             The new user assigns an unique identificationnumber based on the
#             last number stored in the database.
#
# CGI-variables:
#             kod, namn, tel, mobil, sok, email, ansvar, webadmin, proj, titel
#
# Stored in DB:
#             userid, namn, tel}, mobil, sok, email, ansvar, webadmin
#
##############################################################################

#********* Initiera subrutiner och variabler **
sub tolka_formular;
sub koda_till_mac;
use DBI;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$datum = localtime;

#********* Huvud program ***********
tolka_formular;

print "Content-Type: text/html\n\n";
print"<body background=bilder/bkgrnd2.gif><br>";
koda_till_mac ("namn");

#*************Tar bort användare om den finns
$user_query = "remove from user_table where kod = $form{kod};";
$sth = $dbh->prepare($user_query);
$rader = $sth->execute;
#************
$dbh  -> disconnect;

$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#************** Hämtar sista projektkoden *******************
$user_query = "select max(kod) from user_table";
$sth = $dbh->prepare($user_query);
$rader = $sth->execute;
@count = $sth->fetchrow_array;
$userid = $count[0]+1;
#************

if ($form{webadmin} eq 'true'){
$webadmin='TRUE';
}else{
$webadmin='FALSE';}
```

```
$dbh  -> disconnect;


#************Lagrar projektinformatioinen i
User_tabel************************

$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
#*********** Spara ny ide i databasen ************
$rv = $dbh->do("INSERT INTO user_table VALUES
($userid, '$form{namn}', '$form{tel}' , '$form{mobil}', '$form{sok}',
'$form{email}','', '$webadmin', '')");
if ($rv == 1)
{

 print "<BR><H2><CENTER>Uppdateringen utf&ouml;rd<BR></H2>";
print"$form{titel}";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej!!, var god f&ouml;rs&ouml;k
senare!<BR></H2>";
}
$dbh  -> disconnect;


#************Lagrar projektinformatioinen i User_proj*************************
#*********** Spara ny prenumerationer i databasen ************
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
#*********** Spara ny ide i databasen ************
@proj = split " ", $form{proj};
foreach $kod (@proj)
{
koda_till_mac ("$kod");
$ansvar = $form{$kod};

       $rv = $dbh->do("INSERT INTO user_proj VALUES
              ($userid, $kod, '$ansvar')");

}
if ($rv == 1)
{
 print "<BR><H2><CENTER>Uppdateringen utf&ouml;rd<BR></H2><BR><a
href=\"user.cgi\" target=main><< Tillbaka</a>";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej!!, var god f&ouml;rs&ouml;k
senare!<BR></H2><BR><a href=\"user.cgi\" target=main><< Tillbaka</a>";
}

$dbh  -> disconnect;

#****************** Subrutiner ***
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
```

```
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}

#********** Sub koda_till_mac **********
sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'","/");
     my @mac    =
("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;","&acute\;","&#47
\;");
     my $i,$x;

for($i=0;$i<=$#matcha;$i++)
  {
   $form{"$matcha[$i]"} =~ s/\\/&#92\;/gs;
   for($x=0;$x<=$#tkn;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;
    }
  }
}
```

```
#!/usr/bin/perl

################################################################################
# Program:    spara_user_edit.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Update the database with the changes made in the input-form.
#
# CGI-variables:
#             titel, namn, email, meddelande, keys, fil, proj_kod
#
# Stored in DB:
#             kod, titel, signatur, Date, meddelande, email, nyckelord, filkod,
#             filnamn, path, proj_kod
#
################################################################################

#********* Initiera subrutiner och variabler **
sub tolka_formular;
sub koda_till_mac;
use DBI;
tolka_formular;

print "Content-Type: text/html\n\n";
print"<body background=bilder/bkgrnd2.gif><br>";

koda_till_mac ("namn","ansvar");

print"namn: $form{namn}<br>";
print"Tel: $form{tel}<br>";
print"Mobil: $form{mobil}<br>";
print"Sök: $form{sok}<br>";
print"Email: $form{email}<br>";
print"Ansvar: $form{ansvar}<br>";
print"Admin: $form{webadmin}<br>";

#********* Huvud program ***********
$datum = localtime;
$dbh1  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
#*************Tar bort användare om den finns
$user_query1 = "delete from user_table where kod = $form{kod};";
$sth1 = $dbh1->prepare($user_query1);
$rader1 = $sth1->execute;
#************

$dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
#*************Tar bort användare om den finns
$user_query2 = "delete from user_proj where kod = $form{kod};";
$sth2 = $dbh2->prepare($user_query2);
$rader2 = $sth2->execute;
#************

$userid = $form{kod};

print"$userid";
```

```
if ($form{webadmin} eq 'true')
 { $webadmin='TRUE'; }
else
 { $webadmin='FALSE';}

#************Lagrar projektinformatioinen i
User_tabel************************
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

#*********** Spara ny ide i databasen ************
$rv = $dbh->do("INSERT INTO user_table VALUES
($userid, '$form{namn}', '$form{tel}' , '$form{mobil}', '$form{sok}',
'$form{email}','$form{ansvar}', '$webadmin', '')");


if ($rv == 1)
{
 print "<BR><H2><CENTER>Uppdateringen utf&ouml;rd av användartabell<BR></H2>";
 print"$form{titel}";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej för användartabell !!, var god
 f&ouml;rs&ouml;k senare!<BR></H2>";
}
$dbh  -> disconnect;

#************Lagrar projektinformatioinen i User_proj*************************
#*********** Spara ny prenumerationer i databasen ************
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
#*********** Spara ny ide i databasen ************
@proj = split " ", $form{proj};
foreach $kod (@proj)
{
 print"$kod";
 koda_till_mac ("$kod");
 $ansvar = $form{$kod};
 $rv = $dbh->do("INSERT INTO user_proj VALUES
             ($userid, $kod, '$ansvar')");
}
if ($rv == 1)
{
 print "<BR><H2><CENTER>Uppdateringen utf&ouml;rd för projekttabell<BR></H2><a
href=\"user.cgi\" target=main><< Tillbaka</a>";
 print"$form{titel}";
}
else
{
 print "<BR><H2><CENTER>Databasen svarar ej för projekttabell !!, var god
 f&ouml;rs&ouml;k senare!<BR></H2><BR>\<a href=\"user.cgi\" target=main><<
 Tillbaka</a>";
}

$dbh  -> disconnect;
$dbh1  -> disconnect;
$dbh2  -> disconnect;
```

```
#**********************************subrutiner*********************************
**
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}
#********** Sub koda_till_mac **********
sub koda_till_mac
{
     my @matcha = @_;
     my @tkn    = ("å","Å","ä","Ä","ö","Ö","'","/");
     my @mac    =
("&aring\;","&Aring\;","&auml\;","&Auml\;","&ouml\;","&Ouml\;","&acute\;","&#47
\;");
     my $i,$x;

for($i=0;$i<=$#matcha;$i++)
  {
   $form{"$matcha[$i]"} =~ s/\\/&#92\;/gs;
   for($x=0;$x<=$#tkn;$x++)
    {
     $form{"$matcha[$i]"} =~ s/$tkn[$x]/$mac[$x]/gs;
    }
  }
}
```

```
#!/usr/bin/perl

###############################################################################
# Program:    tabort_proj_edit.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Remove the specified project from the table proj based on the
#             choice from the input form.
#
# CGI-variables:
#             proj
#
###############################################################################

#********* Initiera subrutiner och variabler **
sub tolka_formular;
use DBI;
tolka_formular;
#********* Huvud program ***********
print "Content-Type: text/html\n\n<body background=bilder/bkgrnd2.gif><br>";
@chkbox = split " ", $form{proj};
#*********** Spara ny prenumerationer i databasen ************
$rv=1;
foreach $rad (@chkbox)
{
 $dbh1  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
 #*************Tar bort projekt om den finns
 $user_query1 = "delete from proj where proj_kod = $rad;";
 $sth1 = $dbh1->prepare($user_query1);
 $rader1 = $sth1->execute;
 #************
 $dbh1  -> disconnect;
}
print "<BR><BR><BR><BR><BR><BR><H2><CENTER>Uppdateringen utf&ouml;rd
<BR></H2><BR><a href=\"list_admin.cgi\" target=main><< Tillbaka</a>";
#*********************subrutiner**********
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {  $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi; }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          { $form{$par[$i]}.= "\n".$par[$i+1]; }
          else
          { $form{$par[$i]} = $par[$i+1];   }
       }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:    tabort_user_edit.cgi
# Date:       7/7-1999
# Copyright:  Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#             Strömberg
#             dss98f-2@informatik.gu.se
#
# Description:
#             Remove both the specified user from the user_table and all related
#             records in the user_proj table which are related to the specified
#             user.
#
# CGI-variables:
#             user
#
##############################################################################

#********* Initiera subrutiner och variabler **
sub tolka_formular;
use DBI;
tolka_formular;

#********* Huvud program ***********
print "Content-Type: text/html\n\n";
print"<body background=bilder/bkgrnd2.gif><br>";
@chkbox = split " ", $form{user};

#*********** Spara ny prenumerationer i databasen ************
$rv=1;
foreach $rad (@chkbox)
{
 $dbh1  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

 #*************Tar bort användare om den finns
 $user_query1 = "delete from user_table where kod = $rad;";
 $sth1 = $dbh1->prepare($user_query1);
 $rader1 = $sth1->execute;
 #************
 $dbh1  -> disconnect;
 $dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);

 #*************Tar bort användare om den finns
 $user_query2 = "delete from user_proj where kod = $rad;";
 $sth2 = $dbh2->prepare($user_query2);
 $rader2 = $sth2->execute;
 #************
 $dbh2  -> disconnect;
}

print "<BR><BR><BR><BR><BR><BR><H2><CENTER>Uppdateringen utf&ouml;rd
<BR></H2><BR><a href=\"user.cgi\" target=main><< Tillbaka</a>";

#********************subrutiner**********
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
```

```
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   user.cgi
# Date:      7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out an input-form in order to add a new user, and seeks the
#            database for last user id-number stored and print out this in the
#            input form. The script also collects a list of all current
#            projects in order to relate the specific user to a named
#            responsibility within a specific project.
#
# CGI-variables:
#            kod
#
##############################################################################

#** Filnamn och variabler **
use DBI;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$agendaprg = "";

#****************** huvudprogram ***
#************ Hämtar true or false från user_proj***
$meddelande_query = "select * from user_table where kod = $form{kod}'";
$sth = $dbh->prepare($meddelande_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
 @anv = $sth->fetchrow_array;
}
if ($anv[7] eq 'true')
{
 $chkbox = 'checked';
}
else
{
 $chkbox = '';
}

#******** Skriv ut ändrings formuläret *****************
print "Content-Type: text/html\nPragma: no-cache\n\n";
print"<body background=../bilder/bkgrnd2.gif>";
print"<center><a href=user_edit.cgi> [Ta bort och editera användare]</a>";

tolka_formular;

#********* Hämtar ny användarid från User_table ********
#************** Hämtar sista projektkoden ********************
$user_query = "select max(kod) from user_table";
$sth = $dbh3->prepare($user_query);
```

```
$rader = $sth->execute;
@count = $sth->fetchrow_array;
$userid = $count[0]+1;
#************
$dbh3  -> disconnect;

print <<_HTML_;
<FORM ACTION="skapa_user.cgi" METHOD="POST">
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr>
      <td>

      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  width=601 background="bilder/bkgrnd2.gif">
      <tr>
      <td width="12" height="25" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" height="35" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_laggtill.gif"
      width=272 height=21 hspace=0 vspace=0 border=0 align="middle"
      alt=""><br><hr></td>
      <td width="12" align="right" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <table border="0" align="left" cellspacing="0" cellpadding="8"
      valign="top" background="bilder/bkgrnd2.gif">
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_a.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver> 
      $userid</font>
      </td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_1.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <INPUT TYPE=text NAME="namn" VALUE="" SIZE="44">
      </td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      </tr>
      <tr>
```

```
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_2.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
      <INPUT TYPE=text NAME="tel" VALUE=""
      SIZE="15">        
      <img src="bilder/form_anv_3.gif" width=47 height=30 hspace=0 vspace=0
      border=0 alt="">
      <INPUT TYPE=text NAME="mobil" VALUE="" SIZE="15">
      </td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"> </td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_4.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
      <INPUT TYPE=text NAME="sok" VALUE=""
      SIZE="15">        
      <img src="bilder/form_anv_5.gif" width=47 height=30 hspace=0 vspace=0
      border=0 alt="">
      <INPUT TYPE=text NAME="email" VALUE="" SIZE="32">
      </td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_6.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" valign="top" background="bilder/bkgrnd22.gif">
_HTML_

print <<_HTML_;
<table border=0>
<TR>
<TD><font face=helvetica size=2 face=helvetica color=silver>Projekt</font></TD>
<TD><font face=helvetica size=2 face=helvetica
color=silver>    Ansvar</font></TD>
</TR>
_HTML_

#************ Hämtar projekt ***
$proj_query = "select titel,proj_kod from proj'";
$sth = $dbh2->prepare($proj_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
 @proj = $sth->fetchrow_array;
 print <<_HTML_;
      <TR>
      <TD><INPUT TYPE=checkbox NAME="proj" VALUE="$proj[1]" SIZE="32"><font
      face=helvetica size=2 face=helvetica color=silver>$proj[0]</font></TD>
      <TD>    <INPUT TYPE=text NAME="$proj[1]"
      SIZE="32"></TD>
      </TR>
_HTML_
```

```
}

print"</table>";
print <<_HTML_;
       </td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_8.gif"
       width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
       <INPUT TYPE=checkbox NAME="webadmin" value="true" SIZE="44">
       <font face=helvetica size=2 face=helvetica color=silver>
       Web administratör</font>
       </td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><input  type=submit value="Spara
       användare"></td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       </tr>
       </table>
       </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
       height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
       height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
       </tr>
       </table>
       </td>
       </tr>
</table>
</form>
_HTML_

print <<_HTML_;
</body>
</html>
_HTML_

$dbh -> disconnect;
$dbh2 -> disconnect;
```

```
#*********************SUBRUTINER***********************'
sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}

#***** Felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   user_edit.cgi.
# Date:      7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out a list of all users in order to either delete or edit
#            them.
#
##############################################################################

#** Filnamn och variabler **
use DBI;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$agendaprg = "";

#******** Skriv ut ändrings formuläret *****************
print "Content-Type: text/html\nPragma: no-cache\n\n";
print"<body background=../bilder/bkgrnd2.gif >";
print"<center><a href=user.cgi> [Tillbaka]</a>";

print <<_HTML_;
<FORM ACTION="tabort_user_edit.cgi" METHOD="POST">
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr>
      <td>
      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  width=601 background="bilder/bkgrnd2.gif">
      <tr>
      <td width="46" height="25" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_tabort.gif"
      width=272 height=21 hspace=0 vspace=0 border=0 align="middle"
      alt=""></td>
      <td width="12" align="right" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20">
      <font face=helvetica size=2 face=helvetica color=silver>
      Markera de användare du vill ta bort eller klicka på AnvändarNr för att
      editera.
      </font><br><hr> </td>
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      </tr>
      <tr>
```

```
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <table border="0" align="left" cellspacing="0" cellpadding="2"
      valign="top" background="bilder/bkgrnd2.gif">
      <tr>
      <td width="72" height="20" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>AnvändarNr</font>
      </td>
      <td  width="90" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>Namn</font>
      </td>
      <td nowrap width="160" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>Email</font>
      </td>
      <td nowrap width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>Radera</font>
      </tr>
_HTML_

print"</body><br>";
print"<body background=../bilder/bkgrnd2.gif alink=teal link=silver
vlink=teal>";

#************ Hämtar meddelanden ***
$meddelande_query = "select * from user_table order by kod'";
$sth = $dbh->prepare($meddelande_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
 @anv = $sth->fetchrow_array;
 print <<_HTML_;
      <tr>
      <td width="72" height="20" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver><a
      href=user_edit_anvnr.cgi?kod=$anv[0]><i>$anv[0]</i></a></font>
      </td>
      <td width="200" nowrap align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver><a
      href=user_edit_anvnr.cgi?kod=$anv[0]>$anv[1]</a></font>
      </td>
      <td nowrap width="42" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver>$anv[5]</font>
      </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
         <INPUT TYPE="checkbox" NAME="user"
      VALUE="$anv[0]"></td>
      </tr>
_HTML_
```

```
}

$dbh -> disconnect;
print <<_HTML_;
       <tr>
       <td width="72" height="20" nowrap align="left" valign="bottom"
       background="bilder/bkgrnd22.gif">
        
       </td>
       <td width="200" nowrap align="left" valign="bottom"
       background="bilder/bkgrnd22.gif">
       <br><INPUT TYPE=submit VALUE="Ta bort användare">
       </td>
       <td width="42" align="center" valign="bottom"
       background="bilder/bkgrnd22.gif"> 
       </td>
       <td width="100%" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       </tr>
       </table>
       </td>
       <td width="12" align="right valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
       height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
       height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
       </tr>
       </table>
       </td>
       </tr>
</table>
</form>
</body>
</html>
_HTML_
```

```
#!/usr/bin/perl

##############################################################################
# Program:   user_edit_anvnr.cgi
# Date:      7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out a input-form with preprinted information about the
#            specific user chosen. The script prints also a list of all current
#            projects and check if the chosen user are related, if so as what,
#            and preprint this information.
#
# CGI-variables:    kod
#
##############################################################################

#****************** Initiera subrutiner och variabler ***
use DBI;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$agendaprg = "";

#****************** huvudprogram ***
tolka_formular;

#******** Skriv ut ändrings formuläret *****************
print "Content-Type: text/html\nPragma: no-cache\n\n";
print"<body background=../bilder/bkgrnd2.gif>";
print"<center><a href=user.cgi> [Tillbaka]</a>";

#************ Hämtar meddelanden ***
$meddelande_query = "select * from user_table where kod = $form{kod}";
$sth = $dbh->prepare($meddelande_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
 @anv = $sth->fetchrow_array;
 if ($anv[7] eq '1')
  {
   $chkbox = 'Checked';
  }
 else
  {
   $chkbox = '';
  }
}

print <<_HTML_;
<FORM ACTION="spara_user_edit.cgi" METHOD="POST">
<input type=hidden name="kod" value=$form{kod}>
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
       <tr>
```

```
<td>
<table border="0" align="left" cellspacing="0" cellpadding="0"
valign="top"  width=601 background="bilder/bkgrnd2.gif">
<tr>
<td width="12" height="25" align="left" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
height=11 hspace=0 vspace=0 border=0 align="left" alt=""> </td>
<td width="100%" height="35" align="center" valign="bottom"
background="bilder/bkgrnd22.gif"> </td>
<td width="12" align="right" valign="top"
background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
<td width="100%" align="center" valign="bottom"
background="bilder/bkgrnd22.gif" height="20">
<font face=helvetica size=2 face=helvetica color=silver>
Editera användaren och klicka sedan på "Spara ändringar" längst
ner.</font><br><hr> </td>
<td width="12" align="right" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
</tr>
<tr>
<td width="12" align="left" valign="bottom"
background="bilder/bkgrnd22.gif" height="20"> </td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<table border="0" align="left" cellspacing="0" cellpadding="8"
valign="top" background="bilder/bkgrnd2.gif">
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_a.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<font face=helvetica size=3 face=helvetica color=silver>$form{kod}</font>
</td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_1.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" align="left" valign="bottom"
background="bilder/bkgrnd22.gif">
<INPUT TYPE=text NAME="namn" VALUE="$anv[1]" SIZE="44">
</td>
<td width="42" align="right" valign="bottom"
background="bilder/bkgrnd22.gif"></td>
</tr>
<tr>
<td width="42" height="40" align="left" valign="bottom"
background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_2.gif"
width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
<td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
```

```
       <INPUT TYPE=text NAME="tel" VALUE="$anv[2]"
       SIZE="15">        
       <img src="bilder/form_anv_3.gif" width=47 height=30 hspace=0 vspace=0
       border=0 alt="">
       <INPUT TYPE=text NAME="mobil" VALUE="$anv[3]" SIZE="15">
       </td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_4.gif"
       width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
       <INPUT TYPE=text NAME="sok" VALUE="$anv[4]"
       SIZE="15">        
       <img src="bilder/form_anv_5.gif" width=47 height=30 hspace=0 vspace=0
       border=0 alt="">
       <INPUT TYPE=text NAME="email" VALUE="$anv[5]" SIZE="32">
       </td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="top"
       background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_6.gif"
       width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
_HTML_

print <<_HTML_;
       <table border=0>
       <TR>
       <TD><font face=helvetica size=2 face=helvetica
       color=silver>Projekt</font></TD>
       <TD><font face=helvetica size=2 face=helvetica
       color=silver>    Ansvar</font></TD>
       </TR>
_HTML_

#************ Hämtar meddelanden ***
$proj_query = "select titel,proj_kod from proj'";
$sth = $dbh2->prepare($proj_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
{
 @proj = $sth->fetchrow_array;

       $Proj_ansvar = '';
       $Proj_checked = '';
       #***** Ser efter vilka proj som användaren är aktiv i i user_proj  ***
       $proj_query3 = "select * from user_proj where kod = $form{kod} and
       proj_kod =  $proj[1]";
       $sth3 = $dbh3->prepare($proj_query3);
       $rader3 = $sth3->execute;

       for ($j = 0; $j < $rader3; $j++)
       {
```

```
	@proj_aktiv = $sth3->fetchrow_array;
	$Proj_checked = 'Checked';
	$Proj_ansvar = $proj_aktiv[2];
	}
	#*********************************************************************

print <<_HTML_;

	<TR>
	<TD><INPUT TYPE=checkbox NAME="proj" VALUE="$proj[1]" SIZE="32"
	$Proj_checked><font face=helvetica size=2 face=helvetica
	color=silver>$proj[0]</font></TD>
	<TD>    <INPUT TYPE=text NAME="$proj[1]"
	value="$Proj_ansvar" SIZE="32"></TD>
	</TR>
_HTML_
}

print"</table>";
print <<_HTML_;
	</td>
	<td width="42" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"></td>
	</tr>
	<tr>
	<td width="42" height="40" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_8.gif"
	width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
	<td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
	<INPUT TYPE=checkbox NAME="webadmin" VALUE="true" SIZE="44" $chkbox>
	<font face=helvetica size=2 face=helvetica color=silver> 
	Web administratör</font>
	</td>
	<td width="42" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"></td>
	</tr>
	<tr>
	<td width="42" height="40" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"></td>
	<td width="100%" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"><input  type=submit value="Spara
	ändringar"></td>
	<td width="42" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif"></td>
	</tr>
	</table>

	</td>
	<td width="12" align="right" valign="bottom"
	background="bilder/bkgrnd22.gif" height="20"> </td>
	</tr>
	<tr>
	<td width="12" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
	height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
	<td width="100%" align="left" valign="bottom"
	background="bilder/bkgrnd22.gif"> </td>
```

```
      <td width="12" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
      </tr>
      </table>
      </td>
      </tr>
</table>
</form>
</body>
</html>
_HTML_
$dbh -> disconnect;
$dbh2 -> disconnect;
$dbh3 -> disconnect;

#********************SUBRUTINER**********************'
sub tolka_formular
{
      my ($buffer, @par, $i);
      $buffer ="";
      $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
      read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
      eq 'POST';
      $buffer =~ tr/+/ /;
      @par = split /[&=]/, $buffer;
      foreach $par (@par)
      {
         $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
      }
      for ($i=0; $i<$#par; $i+=2)
      {
         if ($form{$par[$i]})
         {
            $form{$par[$i]}.= "\n".$par[$i+1];
         }
         else
         {
            $form{$par[$i]} = $par[$i+1];
         }
      }
}
#***** Felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}
```

```
#!/usr/bin/perl

##############################################################################
# Program:   user_reg.cgi
# Date:      7/7-1999
# Copyright: Faramarz Agahi, Jörgen Fredman, Mathias Horndahl, Lars Tong-
#            Strömberg
#            dss98f-2@informatik.gu.se
#
# Description:
#            Prints out a input-form in order to let the user register
#            him/herself in order to open an account to the system.
#
# CGI-variables:
#            kod
#
##############################################################################

#** Filnamn och variabler **
use DBI;
sub tolka_formular;
$dbh  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh2  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$dbh3  = DBI->connect ("dbi:Pg:dbname = dss98f_2", "dss98f-2", undef);
$agendaprg = "";

#****************** huvudprogram ***
#************ Hämtar true or false från user_proj***
$meddelande_query = "select * from user_table where kod = $form{kod}'";
$sth = $dbh->prepare($meddelande_query);
$rader = $sth->execute;

for ($i = 0; $i < $rader; $i++)
 { @anv = $sth->fetchrow_array; }
if ($anv[7] eq 'true')
 { $chkbox = 'checked'; }
else{ $chkbox = ''; }

#******** Skriv ut ändrings formuläret *****************
print "Content-Type: text/html\nPragma: no-cache\n\n";
print"<body background=../bilder/bkgrnd2.gif>";
tolka_formular;

#********* Hämtar ny användarid från User_table ********
#*************** Hämtar sista projektkoden ********************
$user_query = "select * from user_table";
$sth = $dbh3->prepare($user_query);
$rader = $sth->execute;
#************
for ($i = 0; $i < $rader; $i++)
{
 @user = $sth->fetchrow_array;
 $userid = $user[0];
}
$userid = $userid + 1;
$dbh3  -> disconnect;

print <<_HTML_;
<FORM ACTION="skapa_user_reg.cgi" METHOD="POST">
```

```
<table width="0" border="0" cellspacing="0" cellpadding="0" align="center"
valign="TOP"  background="bkgrnd2.gif" nowrap>
      <tr>
      <td>
      <table border="0" align="left" cellspacing="0" cellpadding="0"
      valign="top"  width=601 background="bilder/bkgrnd2.gif">
      <tr>
      <td width="12" height="25" align="left" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner1.gif" width=12
      height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" height="35" align="center" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=4 face=Arial color=silver><b>Välkommen
      !</<b></font><br>
      <font face=helvetica size=2 face=helvetica color=silver>För att systemet
      skall bli så enkelt att använda som möjligt ber vi dig här fylla i din
      personuppgifter och spara detta genom att klicka på Spara-knappen.
      </font>
      <hr></td>
      <td width="12" align="right" valign="top"
      background="bilder/bkgrnd22.gif"><img src="bilder/corner2.gif" width=11
      height=12 hspace=0 vspace=0 border=0 align="right"  alt=""></td>
      </tr>
      <tr>
      <td width="12" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif" height="20"> </td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <table border="0" align="left" cellspacing="0" cellpadding="8"
      valign="top" background="bilder/bkgrnd2.gif">
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_a.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <font face=helvetica size=2 face=helvetica color=silver> 
      $userid</font>
      </td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_1.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif">
      <INPUT TYPE=text NAME="namn" VALUE="" SIZE="44">
      </td>
      <td width="42" align="right" valign="bottom"
      background="bilder/bkgrnd22.gif"></td>
      </tr>
      <tr>
      <td width="42" height="40" align="left" valign="bottom"
      background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_2.gif"
      width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
      <td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
```

```
       <INPUT TYPE=text NAME="tel" VALUE=""
       SIZE="15">        
       <img src="bilder/form_anv_3.gif" width=47 height=30 hspace=0 vspace=0
       border=0 alt="">
       <INPUT TYPE=text NAME="mobil" VALUE="" SIZE="15">
       </td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       </tr>
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/form_anv_4.gif"
       width=47 height=30 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" valign="bottom" background="bilder/bkgrnd22.gif">
       <INPUT TYPE=text NAME="sok" VALUE=""
       SIZE="15">        
       <img src="bilder/form_anv_5.gif" width=47 height=30 hspace=0 vspace=0
       border=0 alt="">
       <INPUT TYPE=text NAME="email" VALUE="" SIZE="32">
       </td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       </tr>
_HTML_

print <<_HTML_;
       <tr>
       <td width="42" height="40" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><input  type=submit value="Spara"></td>
       <td width="42" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"></td>
       </tr>
       </table>
       </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif" height="20"> </td>
       </tr>
       <tr>
       <td width="12" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner3.gif" width=12
       height=11 hspace=0 vspace=0 border=0 align="left" alt=""></td>
       <td width="100%" align="left" valign="bottom"
       background="bilder/bkgrnd22.gif"> </td>
       <td width="12" align="right" valign="bottom"
       background="bilder/bkgrnd22.gif"><img src="bilder/corner4.gif" width=11
       height=12 hspace=0 vspace=0 border=0 align="right" alt=""></td>
       </tr>
       </table>
       </td>
       </tr>
</table>
</form>
_HTML_

print <<_HTML_;
</body>
</html>
```

```
_HTML_

$dbh -> disconnect;
$dbh2 -> disconnect;

#*********************SUBRUTINER***********************'

sub tolka_formular
{
       my ($buffer, @par, $i);
       $buffer ="";
       $buffer = $ENV{'QUERY_STRING'} if $ENV{'REQUEST_METHOD'} eq 'GET';
       read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'}) if $ENV {'REQUEST_METHOD'}
       eq 'POST';
       $buffer =~ tr/+/ /;
       @par = split /[&=]/, $buffer;
       foreach $par (@par)
       {
          $par =~ s/%([0-9A-F]{2})/chr(hex($1))/egi;
       }
       for ($i=0; $i<$#par; $i+=2)
       {
          if ($form{$par[$i]})
          {
             $form{$par[$i]}.= "\n".$par[$i+1];
          }
          else
          {
             $form{$par[$i]} = $par[$i+1];
          }
       }
}
#***** Felkontroll ***
sub felkontroll
{
   my $typ = $_[0];
   print "Din inmatning är ej korrekt, var god ändra $typ!";
   die;
}
```