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СИСТЕМА ЗА ВЗЕМАНЕ НА РЕШЕНИЕ

DECISION MAKING SYSTEM

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Abstract. The decision making is an important manager's activity. It is a permanent and continuous activity performed by the managers. Besides their major functions, the managers take all the time managerial decisions concerning various problem and of various nature. Generating of reports does not automatically solve problems and is not decision taking.

Anywhere throughout the world, as well as in Bulgaria, the managers of commercial, industrial and financial establishments try to find the way for an efficient use of information. During the past years large operative databases have been accumulated, like information of customers, suppliers and competitors. Business necessitates the use of information at a very detailed level. Terms like Data Warehouses, Decision support systems, Data mining are often used to describe one and the same thing, but in fact each of them describes a specific element of the overall approach of decisions support.

The Decision Support System DSS is a computer-based system, designed to assist those who make decisions and face badly structured problems through the data's direct interaction with the analytical models. The classic means of implementation of decision support systems are very closely related to the means of development of databases management systems. There are three modules in the DSS allowing the analysis of information. It is orientated to specific problems and is closely connected to the information needs of the decision carrier. They use a dialogue, an application of different models and a graphical presentation of information. DSS have three major components: database, models-base and consumer's interface.

Key words: Decision making, Decision Support System, Information Support

Introduction

Everywhere throughout the world, as well as in Bulgaria, the managers of trade, production, financial and tourist enterprises are trying to find ways for effective use of information. According to Magderova's opinion under the current conditions of fast changes in market situation the existence and development of business are impossible without its versatile information support, which is an important base for the improvement of quality and efficiency of the management process. Information as a factor of effective management takes a leading position and becomes one of the

most significant and useful resources of economic activity.¹

In the past years massive operative data has been accumulated - information about clients, suppliers and competitors. The business requires the use of information at a very detailed level. Terms like Data Warehouses, Decision support systems, Data mining are often used to determine the same thing, but in fact each of them describes one specific element from the complete approach to Decision support.

¹ Madgerova R., Information Supply of the Small Business – a Base for Effective Management, International Scientific conference “50 Years University of Forestry”, Sessions “Management And Sustainable Development Fundamental Scientific”, S, 2003, p. 98.

Levels of Decision-making.

According to our opinion DSS (Decision support systems) may be very useful for taking management decisions in the following situations:

1. When there is a large data base, so vast that the manager has difficulties when accessing the data base and deriving a conceptual benefit out of it.

2. When there is a need of processing or calculating in the process of decision making.

3. When there is some tension related to the dead-lines for a final answer or to the process that leads to the decision.

4. When there is a need of making assessment in the identification of problem, in determining alternatives or choosing a decision. The assessment can define the nature of the variables that are being examined or the values given to the known variables.

The concept 'Decision support systems' can be easily interpreted as a system i.e. interconnected elements. This explanation, however, is very broad. Therefore, we will present some more detailed interpretations:

- "DSS is an interactive system based on computer technologies, which assists the managers in the taking of unstructured decisions- decisions that have no procedures or structured course of action".¹

- "DSS is an interactive subsidiary instrument, based on computer technologies, designed to cooperate the managers in complicated tasks requiring human decision. The aim of this system is to support and improve the process of taking a decision".²

- "DSS aims to provide an access to information systems and analytical models directly to the managers and takes the challenge to accept computers as

something of primary importance in the operations related to information".³

- "DSS is the use of the technologies - intellectual, analytical, financial and computerized - with the purpose to promote the improvement of the creativity in decisions which are really important."

Based on the aforementioned definitions of Decision support systems we can conclude that DSS (Decision support systems) provide a computer-based support to the managers who take decisions when they encounter semi structured problems. DSS includes three main components: **data base, model base and user interface**.⁴

DSS can provide a couple of levels for support and the right choice can be determined only by the analysis of the decision. The first level of support gives **access to facts or obtaining of information**. For the manager, finding the necessary information in a mountain of raw data is often a hard task. He can use too much simplified rules of analysis, which could easily be complemented by the routine methods of DSS.

The second level of support includes **the adding of filters and capability of recognizing models towards obtaining of data**. It provides the managers with an opportunity for selective request of information and attaching conceptual meaning to the data. They can take advantage of the routine techniques which present graphical conclusion or analysis of dynamic rows (series), for example.

The third level adds more liberal calculation devices to the first two levels and allows the manager to request **simple calculations, comparisons, forecasts etc**. Then the system resembles an improved calculator programmed to cover some of the manipulations, which the manager has used with such problems out of habit.

The definite level of support provides **useful models for the manager**. Here the

¹ Sprague R. and H. Watson, Decision Support Systems. Putting Theory into Practice, 1986, p.132

²Thierauf Robert J., User- Oriented Decision Support Systems: Accent on Problem Finding, Englewood Cliffs, N.Y.: Prentice Hall, 1988, p.68

³ Keen P. and M. Morton, Decision Support Systems: an Organizational Perspective, 1980, p.181

⁴ www1.ecs.ru.acad.bg/fbm/uis_m/uis-3.pdf, p. 1-19

characteristics of “useful” are important because the model has to be designed to give answers to the questions of the managers, on the basis of which they will act. The model may turn out to be too simple and elemental, and not mathematically perfect. It is often based on heuristic rules and standard procedures for analysis.

The provision of these four levels of support has been a goal to many designers of information systems for a long time. Lately, the changes in technologies give opportunities to the managers to take advantage of such systems. The explicit concentration on the support of decision taking brings, as a result, to a system, which is controlled by them. The traditional models and managerial information

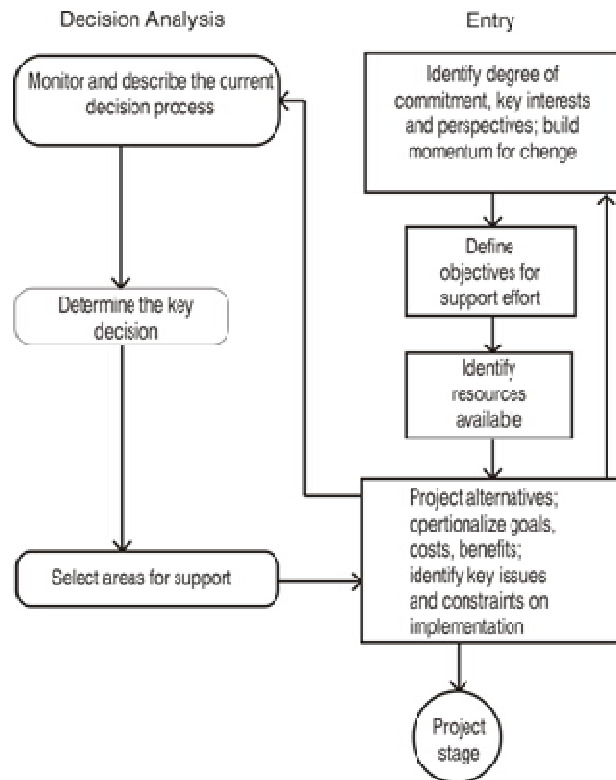
systems in principle do not allow such interaction.

Decision support systems are different according to their formal structure and technical design. But it is important to mention that they are focused on the **support of solutions of managerial problems** and on the significant interaction between the person who takes the decision and the computer.

Building Decision Support System.

The design of DSS is not a linear sequence of specified steps. The differences in the perspectives, organizational coalitions, the definition of a “right” decision, etc, make it very difficult to find out from where to start. The first stage always covers the identification of the key solutions.

Figure 1. The Predesign Cycle



Source: Keen P. and M. Morton, *Decision Support Systems: an Organizational Perspective*, 1980, p.174.

According to American scientists, there should be a stage which precedes the design of DSS.¹ The right-hand side of Figure 1 illustrates the essential steps in the process of execution: a choice of the driving power for a change and development, „agreement” of action covering the realistic mutual expectations and commitment between the parties involved. These initial diagnoses can make some of the analyzed decisions inapplicable; for example it could turn out that the “best” decision requires huge efforts and a particular level of support by the part of the chief executives for some departments, which in fact is not available. In this case we have two obvious options:

1. Attempt to establish support.
2. Re-assessment of the problem situation and taking the “best” decision.

The major aim of this cycle is to ensure the managers’ confidence that the right problem is being worked on. Of course, there are a lot of repetitions during the cycle itself; the objectivity has an influence on the choice of key solutions and areas to be supported. The stage preceding the design is finished with the choice of the right alternative for the design of DSS. In the final choice of alternative for the design of DSS some questions related to the risk and benefits are discussed:

1. Which alternatives offer the best improvement to the existing process of decision taking? Which are the most probable economic benefits? What is the cost of the organizational and conduct benefits?
2. What are the difficulties in conducting such a change? Are we ready to allocate resources and spare some time to provide support for managerial decisions making?
3. Which are the final risks - if the system is far behind the schedule or encounters resistance, what are the prices (financial, behavioral, political etc)? Does

the system allow evolutionary development on stages?

It has to be taken into account that when there is a complicated problem, which is important to the organization, not every project will be implemented in the best way. This ‘initial’ stage requires consensus, compromise and often reevaluation. In this stage the *design criteria* are established and it focuses more on the context than on the techniques. There is a primary need for determining criteria for design. This means that:

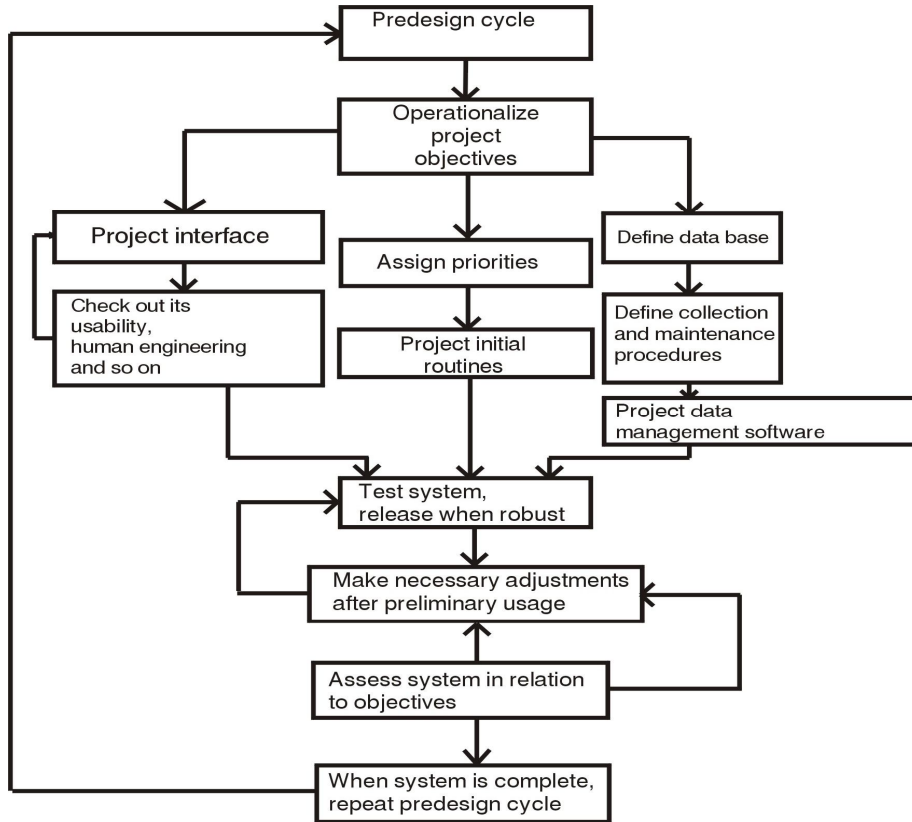
- The cycle preceding the design requires huge efforts.
- Managers’ understanding and opinions in situations concerned with decision taking have an essential contribution in the design process.
- The team working on the design has to simultaneously understand both the existing decision making process and the potential processes.
- The design of DSS has to be evolutionary.

There is no established recipe for the design of DSS. After the stage preceding the design is finished, the specification of the design is in the best case at a level of intensity. Then, it is important for us to focus on **what DSS intends to do** and not how it should look like. Very often some aspects of the planned design turn out to be much more difficult or easier to be conducted. In this case, the person who designs DSS needs clear criteria in order to decide whether to terminate, modify or add specific functions. The key questions at the beginning are:

1. What do we want DSS to achieve?
2. How can we recognize when the system is completed - i.e. when has it reached the actual design?
3. What are the priorities and the sequence of the planned stages for the achievement of goals?

¹ Keen P. and M. Morton, Decision Support Systems: an Organizational Perspective, 1980, p. 167-187

Figure 2. Stages in DSS design



There are different views about the stages of DSS design.¹ The sequence in the design of DSS which we propose is presented in figure 2.

In the stage preceding the design the goals are defined in a more general way. After this stage the aims should be defined very accurately, as they represent the major criteria for the formal design of DSS. **The design must be based on its use: What are we going to do with DSS?** The goals

of the design of DSS can be determined in the following way:

- DSS should allow an easy access to all the contracts and related data which we can collect.
- DSS should give answers to questions such as: Who has the most of such contracts? What is the average value of the price for...? Which is the biggest contract that the company has received for this year?
- DSS should be used by other managers as well, especially in Marketing.
- The manager should be able to start his/her work with DSS as soon as possible.

The team for the design of DSS translates these statements into technical specifications. For example, the question: What does DSS do, can be best answered by determining of "imperatives" or

¹ See: Keen P. and M. Morton, *Decision Support Systems: an Organizational Perspective*, 1980; Sprague R. and H. Watson, *Decision Support Systems. Putting Theory into Practice*, 1986; Thierauf Robert J., *User- Oriented Decision Support Systems: Accent on Problem Finding*, Englewood Cliffs, N.Y.: Prentice Hall, 1988; Turban E., *Decision Support Systems and Expert Systems*, 2d ed., New York: Macmillan, 1990

commands. Some authors points out that most DSS can be viewed as verbs or imperatives put in order which “do” something: For example, “show me”, “find”, “extrapolate”, etc.¹ According to other authors, most of the requirements for the information-based DSS fall in the category of the adverbs: For example, “Why”, “Who”, “What”, “How many”, etc.²

In fact, the design of DSS involves three almost separate areas: (1) the “user” design determined in the conditions of imperatives, (2) the interface or the “leader” connecting them and (3) the managerial design of the database.

Problems in the building of DSS.

In the design of DSS it is very important to see ‘**what are the priorities and the stages of the system?**’ The priorities may be determined either on the base of the users’ need or as technically applicable. Obviously, the user would define the priorities when it is possible. The main reason for the separation of the interface from the imperatives is the facilitation of the stages of the additional practices and modifications or the extension of the system in time. For example, the manager might want the final phase of the evolutionary design of DSS to emphasize on the recovery of data. Therefore, he plans to add analytical and model-based practices, but has no clear idea about what they are going to be. Therefore, the team designing DSS must be sure that the interface is flexible enough to allow such evolution.

The practice show that some of the most frequent problems that must be solved in the design of DSS:

1. Communication skills - DSS must be mainly communicative with a definite elementary process for providing

applications, moving to new data or practices, etc. It has to be formal and informative. The error messages have to be helpful. The use of commands similar to English is possible in order to minimize writing and to get explicit short answers.

2. Weaknesses- DSS has to cover an internal checkup which is used to avoid mistakes or nonsense. For example, an answer such as “It is not possible to make a prediction; negative proposal for analysis; Please check the data”, would prevent a potential loss of reliable clients. Another aspect of weakness is the system reliability. The computer crash makes the users angry, especially if there is no restarting procedure which allows them to continue without the need of entering the information once again. The program errors obviously are irritating, as well as the invalid data. These problems might turn out to be difficult to deal with.

3. An ease to control: this is an extension of the communicative skills. The team that designs DSS every day has to remind itself that “this is a system of the users, not ours”. Another benefit from the analysis of the narrative decisions is that it can give an idea to the designers about what the users might want in order to feel good while working with DSS: what kind of practices do they need, the suitable for them sequence of analyzing, etc. A prototype of the system would be helpful when checking whether the users can work with DSS in their way.

The design of the interface is often the hardest aspect of DSS, both conceptually and technically. It is hard to predict the needs of the users.

A very important aspect in the design of DSS is the management of data. The professionals in computer science and data technology focus much more on the technology for fixing complicated information structures. What is difficult for many DSS is that they require very broad data base and complicated recovery or sources with unlimited access to the greater part of information. It is hard to get effective

¹ Adelman I., Involving Users in the Development of Decision- Analytic Aids: The Principal Factor in Successful Implementation, Journal of the Operational Research Society, 33, Vol.4, April 1982, p.333-342.

² Turban E., Decision Support Systems and Expert Systems, 2d ed., New York: Macmillan, 1990, p.159

software that can deal with such combination.

Except the needs for software for data management and recovery, the organizational process also might be difficult. It is easy to determine a data base, but it is more difficult to gather and legalize the information and it is almost impossible to maintain it. We do not have concrete recommendations in regard to the management of data for DSS except for mentioning the rule of McColbry and Sulg: "Assume that the information you need does not exist no matter what people tell you".¹ The practice shows that the organizational aspects of the data base are often more difficult to solve than the technical matters where DSS may attract the continuous work in the computer science for the design and the software of data base.

The idea of DSS is that the competent managers will study by using DSS and will start expanding their analysis - then they will require additional support. The evolutionary achievements of the design of DSS suggest that this process of learning will be achieved and the system will facilitate it.

Conclusion

From the things said up to now we can conclude that the process of evolution of DSS is also one of the changes in the process of decision taking. The new stage of the design of the existing DSS requires the same fundamental sequences by starting from the descriptive analysis of the decision making process. The decision making process must have become more effective. These new analysis form the bases of calculation of the system and allow the managers to compare the achievements and to plan the next similar design. Then they have to decide whether there is a potential for further development, and if so,

whether they are ready to allocate funds. This means a repetition of the cycle preceding the design. The evolution is a deliberate strategy which determines the phases and the concrete design, it is not planned and is has an open end.

Nowadays there is a significant gap between the managers and the specialists in managerial information systems. The technical tradition of the managerial information systems, based on the design, rarely discusses the decision taking, unless from normative, rational point of view. On the other hand, decision making process is very complex and a common synthesis is not only significant, but also difficult to perform. Therefore, in our opinion, the analysis, the implementation and use of DSS will help the managers and the specialists in managerial information systems to cooperate and develop more effective applications of the organizations' computer resources, such as DSS.

¹ Keen P., Decision Support Systems: The Next Decade, Decision Support Systems, Vol.3, 1987, p. 260

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