EXTENDED EXECUTIVE INFORMATION SYSTEM (EEIS)

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Abstract: *In the following paper a new class of executive information system is suggested. It is based on a selforganization in management and on a module modeling. The system is multifunctional and multidisciplinary. The structure elements of the system and the common features of the modules are discussed.*

Keywords: *Extended executive information system, evolution management, module modeling, conflict resolution, data warehouse, selforganization, NLP, reality games, agent tree, multiagent system.*

Introduction – the Need of a New Class of Information System

The enterprise management is performed by people, taking positions at different levels of management hierarchy. At the top level are the so-called top-managers (See figure 1). They bear the whole responsibility for realizing the management process from setting the goals to their realization. They are forced continually to take decisions, some of them in situations, critical for the enterprise.

The top-managers deal with large volume of information, caused by the constantly circulating internal and external information streams. They control the realization of a number of activities such as:
- goal definition and planning;
- firm resource integration;
- selection and motivation of the staff;
- execution of the planned tasks;
- management of financial funds and other activities, related to the process of management.
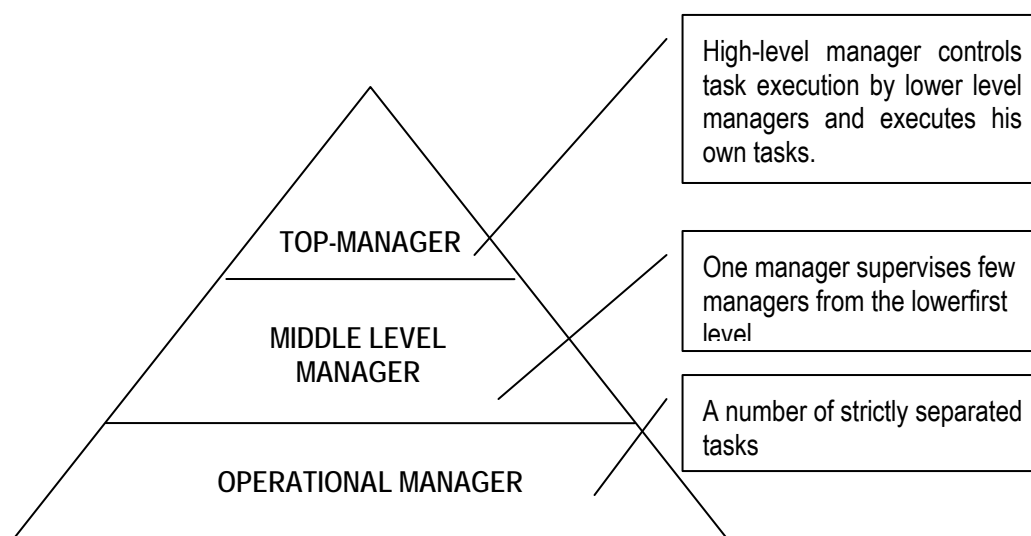

Figure 1: Hierarchy of Management

High-level managers need to be informed for the actions and the intentions of the competitors and for the market trends, as well as to follow the technological evolution of the society, in order to implement at the right time the new technologies in business. Everyone involved in such activities needs to be a narrow specialist in his own field. Top-managers should possess all these abilities, otherwise they will not be able to execute an effective control and management.

Managers do not have free time. They deal with huge amount of information but the human mind does not have the capability to operate with it at this point of evolution. There will always be a risk of missing an important for the enterprise information and some possibilities.

All this increases the tension in managenr's job and leads to a constantly **high stress level**. The stress decreases the quality of the enterprise management. The process of management depends on people, which are **biochemical systems** where flow specific biochemical processes. The number of infarcts, apoplexies and other disorders connected with the stress grows up. Top-managers have no time for personal life and they could not have an adequate rest. Every absence off or disturbance in their work will force them not only to handle the actual information but also the accumulated one too.

The **main problems** of the top-managers can be defined as follows:
- the managers does not have free time;
- huge volumes of information to be operated;
- a risk to miss an important information;
- high stress level;
- decrease of the quality of the enterprise management;
- health problems.

Considering all mentioned above we can assume that every inovation in the field of management must be directed to supporting manager's activities, increase the free time of the managers, improve the management quality and decreasing the stress levels in daily round. This leads to the development of a new class of systems for top-managers based on selforganization and new models of management. They must be adapted to management levels and imitate the thinking process of humans mind. Such system, called extended executive information system, is suggested below.

Common Features of the Extended Executive Information System (EEIS)

Doing their activities managers make operational, tactical and strategical decisions every day. These decisions are better when they exactly correspond to the goals and ambitions of the management subjects and help to realize those ambitions for a minimum time and with small investment and resources. This way the enterprise development is better controled and thus the corporative goals will be achieved.

The choice of the manager, represented as a management decision, is a process, which directs the object's behaviour to the chosen direction and changes its present condition to a new, much perfect, future one, improving it and as a result **the object evoluates**. The managers take decisions through the whole management process. The last one represents a combination of common management functions, such as: goal definition, planning and organization, motivation, control and regulation [Hristov, 1997]. No one from these functions can exist without the others and no one is more significant than the others. They need to be integrated in a united management system. This will contribute for choosing the adequate tools, methods and technologies for achieving the corporate goals.

The extended executive information system has to cover all of the management stages and assists managers in the process of making their decisions. It includes goal definition, knowledge of the object of management, modeling, creation of an ideal model, evaluation of the model, development and implementation of the strategy, elimination of the errors, implementation of the renovated strategy, evaluation of the results and repeating the circle until the goals are achieved. The next step is stabilization of the system and decisions for its future development.

1.Goal definition.

It is the first and main stage of the management process. It determines the direction of the enterprise development. The goal must be specified and clearly defined. It must not contain any contradictions. But the goal definition is not enough for its realization. Many initiatives are needed. The most important one is the evaluation of the goals which includes the definition of the degree for its realization, the time needed, etc. This is quite important since the chosen goal might not be achieved.

The EEIS in this stage has to support a *module for the evaluation of the goal*. It includes some criteria and is connected with the other modules. Some of this criteria can be taken from the **neuro linguistic programming**

(NLP). NLP is a new direction in psychology, differentiate as an independent science. It helps to answer to the question such as:"Could the goals be reached?", "Does its realization depend only on its own resources or on external factors?", "What are the benefits and the disadvantages?", "Do the choosed goal contradict to other corporate goals?" etc. The careful and prompt goal formulation increases the opportunity of diverting the intentions into adequate action needed for their realization. [Older, 2000]. NLP is not only useful as far as the goal definition is concerned. It could be implemented to the whole process of management. That is why it is to be used more frequently in economical theory as well as practice. Its main components are:

- *Neuro* – based on investigation of the way of work of neuro processes;
- *Linguistic* – verbal and noverbal presentation;
- *Programming* – thinking and behavior models [Older, 2000].

2.Knowledge of the object of management.

Every object can be represented as a system. "A system is defined as an integrated set of components, or entities, that interact to achieve a particular function or goal…Systems are composed of interrelated and interdependent subsystems." [Schultheis, 1992, p.31]

At this stage it is important to gather as much information about the management object as possible and to define the elements, subelements and interactions between them. This is the basic system reasearch. It helps to determine some definite dependences, behavioural trends, principles actions etc. This is the moment most errors are made. The reason could be either important factor ignorance or extra factors taken into consideration. The result at the end than is unrealistic. The level of detailization must be defined very carefully. The software realization of this stage can be represented by the *information module*.

3.Modelling.

Managing the object requires modeling. Through the model the information about its elements and subelements is viewed as an easy to understand form. Some alternatives of development and change are outlined. At this stage the software must help to construct the management model. It must be universal and adapted for modeling of different kinds of systems – economical, social, biomedical etc.

The module "Modeling" is based on a model scheme which can be used in different situations and stages of time and for the research and management of heterogeneous objects. It functions as a template for building models describing them in details and in an easy to manipulate form (See figure 2).
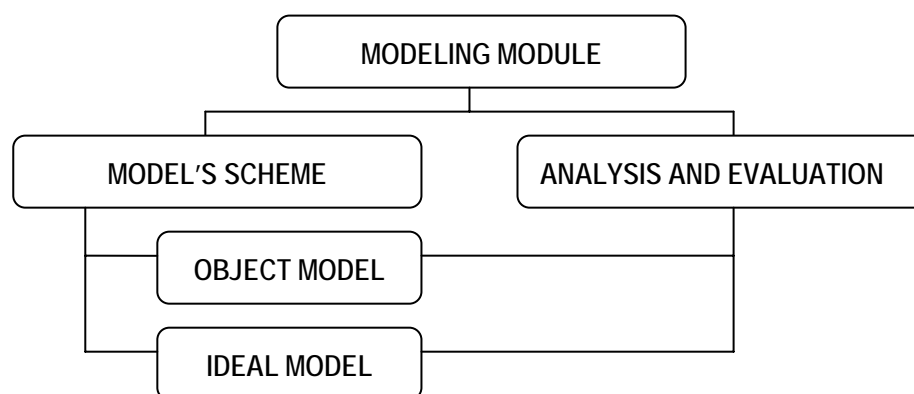
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                        ┌─────────────────────────┐
                        │     MODELING MODULE     │
                        └─────────────────────────┘
              ┌───────────────────┐       ┌──────────────────────────┐
              │   MODEL'S SCHEME   │       │   ANALYSIS AND EVALUATION │
              └───────────────────┘       └──────────────────────────┘
                   ┌───────────────────┐
                   │    OBJECT MODEL   │
                   └───────────────────┘
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                   │    IDEAL MODEL    │
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Figure 2: The elements of the modeling module

4.Creation of the ideal model..

Defining the values of the parameters which describe the required final state of the system.

5.Evaluation of the model.

At this stage the strong and weak aspects of the model are analyzed. The current is compared with the wished one. The elements and subelements which must be changed are defined as well as those which could not be

modified. The corporate opportunities are clarified and the managers can see is there any potential, not completely used.

The activities in points 4 and 5 are included in module "Modeling".

6.Development of the activity strategy.

A system of activities is created, so that the corporate goals are achieved. It is based on a model analysis by comparison of two stages (current and ideal) as well as on different analytical techniques. They help to see the results of the managers' decision and the number of possible alternatives.

This stage covers the management function – planning. It is represented by the *module "Planning"* which includes techniques for developing a business plan for the enterprise activities as well as many other plans with different levels of detailization.

7.Implementation of the strategy.

A step by step realization of the developed plan in point 6. This is the time for recruitment of workers and their work motivation. At this stage the model is checked in real conditions and the errors can be determined. The result is also evaluated. It covers the management functions: organization, motivation and control.

The modules needed are as follows:
- The *module "Organization and control"*. It controls the step by step realization of the plan, and includes control points and gives signals if an error occures.
- The *module "Staff motivation"* is also very important. It is based on a system of activities, comprising sanctions and rewards, as well as personnel stimulation. It contains techniques for evaluation of the personnel work, and definition of the level of individual development, the need for a change in the salary or performed position, additional education, etc. The presense of this module as well as the module for conflict resolution (which is described bellow) is a precondition for effective human resource management, and can also be applied in large enterprises with thousans of workers.

8.Elimination of the errors.

Changes in the model and in the strategy could be made if nessesar*y.* It covers the management function regulation. Overcome the difference between the planned and actual indexes.

At this stage the *module "Regulation"* is used. Its purpose is to offer a variety of alternate decisions for eliminating the errors with all the arguments leading to the choice.

9.Implementation of the renovated strategy.

It covers the management functions: organization, motivation, control and regulation.

10.Evaluating the results and repeating the steps from 1 to 9 until the requirements are fulfilled.

The transition to the new state of the management objects is made.

11.Status stabilization and making decision for the future enterprise development.

Now it must be checked if there is a stable structure. On this basis the new decisions about the enterprise development are made.

Conflict Resolution

Another very important module should be included in the system - *the module "Conflict resolution"*. Its function is to define in advance the possible conflict zones and points in the enterprise and to make them known. On this basis the conflicts are resolved before realy to appear. The module contains identification tools of warning signs for conflicts and also instruments for their non-admission.

A *module for simulations (Reality games)* can be build. With its help the possible situations as a rezult of a management decision can be foreseen. Through the same principle an interactive education for conflicts management could be made.

Every enterprise consists of people who manage it and people who are managed. With their united efforts they reach the corporate goals, working in harmony. There are different kinds of relationship and interconnections between them are. The managed individuals can also influence the managers and their decision.

As much as the purposes and interests of the managed and managers coinsides as less unconflicts there will be in the enterprise activity. The contradictory goals can provoke a conflict. The zone of correspondences must be defined in the goals, interests and abilities of the both sides of the management process (See figure 3).

GOALS, INTERESTS AND ABILITIES OF THE MANAGERS

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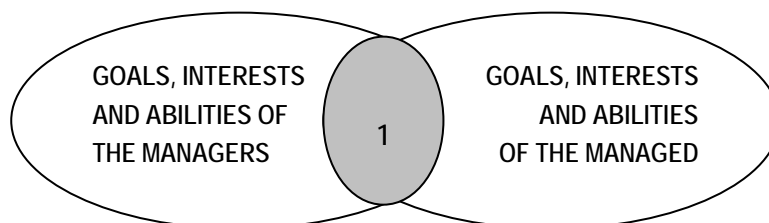GOALS, INTERESTS AND ABILITIES OF THE MANAGED

Figure 3: The zone of correspondences

If the corporate goals are in zone 1 (See figure 3), their realization will be maximum effective. The coordination between these two groups may be achieved with the help of many psychological and financial activities as well as with the proper selection of the staff. This way, by means of some **manipulation technique**s the conflicts can be decreased to the required minimum. It is nesessary because of the fact that if they are not too many, they could provoke the constant aspiration of self-perfection. This can be the reason for corporate growth and se**lforganization**. The good knowledge of the conflict zones is important.

The software application developed for this purpose must include a large volume of information, which must be structured, compared and analysed. As a result the software has to determine the potential conflict zones, the zones of correspondences, as well as to make suggestions for prevention and overcome of the potential conflicts. The data which could be included in the module are the following:

-   Individual characteristics of the managers at the different levels – their personal interests, motivation for work, success and failures, personal experience, family, communication and organizational skills, leadership, relationships with other people, a state of health etc. as well as the individual problem zones – where and under what conditions he/she is inclined to conflicts. The same information must be provided also for the staff and for the enterprise as a whole.

-   Goals of the managers, the staff and the enterprise.

-   Abilities and experience of the managers and the managed. This is their personal potential. On it depends the trust of the managed to the managers and their ability to do the assigned tasks. It is very important the managers to have more abilities and to be more competent and qualified than the staff. The opposite would be a prerequisite of a frustration from workers and can provoke a variety of problems.

-   The desire of personal development and self-perfection of the participants in the management process. The future development of the entire enterprise depends on it.

An **individual model** for each participant in the management process must be developped. In the process of work these models are updated, operated and compared. This makes possible the conflict zones to be outlined and topical information aboit the current state of the management objects and subjects to be kept. The managament decisions made this way will satisfy the needs not only of the managers but also of the managed. This will guarantee harmony and perfect functioning of the enterprise.

System Development

From the point of view of cybernetics the enterprise can be defined as a selforganizing system, which constsits of managing and managed subsystems. Having this in mind the EEIS must contain these subsystems, including their functions and way of working, based on the enterpruse structure. The structure of the enterprise must contain all system elements grouped by categories (See table 1).

MAIN CATEGORIES
Human Resources
Activities
Material Resources
Departments
Communication chanels
Software
Other

Table 1: Main categories of the system – enterprise

From these structure elements can be differentiated separate modules. Subsequently they can unite and grow into an EEIS. So the first category of the table could be described from the module "Human resources" (See table 2).

Module "Numan resources"	
Subcategories	*Describtion of the subcategories*
Personal data	Address, phone number etc.
CV data	Education, working experience, interests etc. before enrolling.
Positions in the enterprise	Personal evolution.
Motivation	Why one would like to work? Why one would like to be a part of the enterprise?
Family status	A full describtion.
Health status	A detail information about past and present disorders as well as the trends and genetic predispositions
Personal abilities	Communication and organizational skills, abbility to work in a team, aggression and so on.
Potential	Is he using all his potential? How can he deal with specific tasks in such fields in which he has no experience before and has no information? Has he an analytical mind? etc.

Table 2: Module "Human resources"

In the enterprise must be created a system of criteria for an evaluation of the staff, based on a system of indexes which can be used in the EEIS. It must include also the information from the tradition software for human resource management, accounting etc.

Such level of detailization must be present in the all other mudules which build the extended executive information system. The EEIS uses the information from all available sources at the enterprise. The inplementation of the technology of data warehoising is needed to unite data from different sources and in different format. Used as a base of the EEIS, the data warehouse makes possible to keep all the available software applications at the enterprise and use them by the implementing the new technologies.

The structure of EEIS is presented at figure 4.

To build these system elements we can use the agent technology. Every structure element can be developed as an agent. The system will turn into a multiagent system where the functions of each agent are adequate to the functions of the manager which position is covered. So we build the agent tree based on the enterprise model and the system of busines rules.

The managing subsystem includes the main business rules as well as an analyzing and control tools. The whole activity of the enterprise subordinates these rules. The managing subsystem controls for the execution of the planned tasks, that are put into it. The planned indexes are compared with the existing through the channels of feed-back relationships from and to the managing subsystem. It is possible to set levels of freedom for the

managing subsystem which allow it to make changes in the primary choosed goal using the data from the managed subsystem. This will turn it into a selforganizing system with its own intellect, analogous to this of the managers.
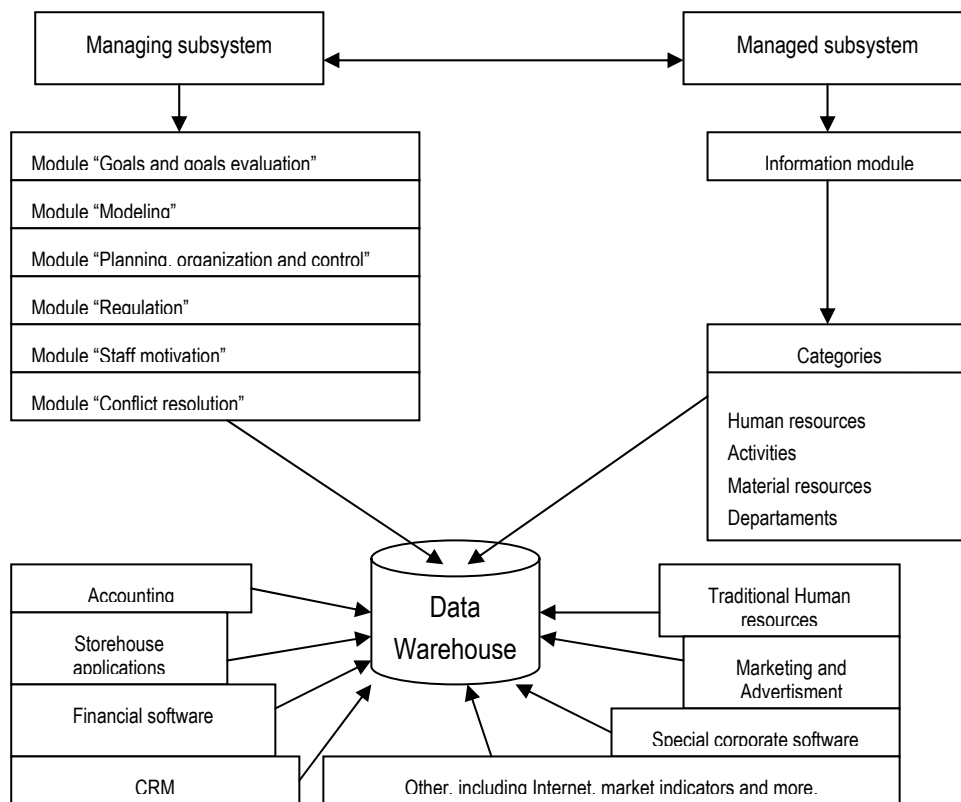
Figure 4: The structure of the extended executive information system

Conclusion

Having in consideration all mentioned above, we can make the conclusion that the Extended Executive Information System has the abbility to supersede the managers in many of their functions and to increase the quality of their work and the quantity of their free time – a resource which the managers do not have at this stage of evolution of the civization. The system is multifunctional and multidisciplinare. It is an information system of the future, based on the human thinking activity.

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