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PRELIMINARY GUIDELINES FOR THE CONSTRUCTION OF AN EXPERT SYSTEM FOR SUPPORT OF THE IMPLEMENTATION PROCESS OF INFORMATION SYSTEMS

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The process implementing of modern information systems in medium and large enterprises, more and more often is associated with a number of problems that can occur already at the planning stage. Often incorrect or incomplete separation of problem factors causes that the procedure of implementation of such a system can significantly lengthen, and in the worst case end in failure. Therefore, a crucial part of this process, it is possible to determine the potential problems and consequences thereof already at an early stage in the project. Modern technologies of artificial intelligence are increasingly becoming an indispensable tool supporting decision-making in different areas of economic activity. In the following work was analyzed the effectiveness of the use of an expert system in the implementation of information systems based on the skeletal system PC-SHELL. On the basis of research was developed scheme of building the knowledge base for future expert system to support the implementation of the information systems.

Keywords: artificial intelligence, the implementation of information systems, risk of failure, expert systems, domain knowledge

1. Introduction

The dynamic development of the economy has meant that the management of various areas of operation of enterprises have become extremely complex. Many companies comes to the conclusion that an important complement to the basic

strategy of the company, is the strategy of the development of information systems [7], which supporting management processes. Very often, companies choosing to implement the system, are not aware of the problems that can arise in various stages of implementation of the system, which in turn can lead to a situation that the implementation will fail [6].

The costs of failed implementation of information systems in the world each year consume 75 billion dollars and affects approximately 90% of the companies that decide to implement strategic informatics solutions [8]. Often incorrect or incomplete separation problem factors causes that the procedure of implementation of such a system can significantly lengthen, and in the worst case end in failure. Therefore, a crucial part of this process, it is possible to determine the potential problems and consequences thereof already at an early stage in the project. Modern technologies in the field of artificial intelligence can be an indispensable tool supports taking decisions at the level of failure probability estimation system implementation at every stage of its implementation. They are equipped with such a system in a knowledge base containing descriptions of identified good practices in the implementation of systems that can be valuable indicators for used to minimalize the risk of implementation informatics systems.

The following paper presents an analysis of the effectiveness of the use of an expert system in the implementation of information systems based on the skeletal system PC-SHELL. Based on the survey should have been developed a proposal for the construction of a knowledge base schema as the basis for the development of future expert system (SE) supporting the decision-making process concerning the procedures for implementation of information systems.

2. Advisory systems

Expert systems are widely used in many fields, especially as advisory systems for the tasks of identification, classification, control, simulation, diagnostics. They are often referred to as systems based on human knowledge to solve complex problems, generally narrow field that usually require human intelligence [1].

The main task of expert systems to support decision-making, using previously accumulated "knowledge" (based on empirical data), derived from human experts in the field. The result is a solution that offers the appropriate level of expertise, together with inference procedures [3]. Extensive use of expert systems is the result of the many advantages that determine their versatility [4]:

α) provide expert opinions, which are cheaper than the expertise of specialists;
β) work faster than specialists;
χ) improve the quality of expertise, by consequence in drawing conclusions and fewer errors;

δ) reduce the length of breaks for systems with continuous operation;
ε) keep readily available expertise, which can be very significant when an insufficient number of experts;
φ) improve safety by replacing specialists in environments and situations hazardous to health or life-threatening;
γ) expertise is comprehensive (it is possible to obtain several alternative solutions);
η) allow a larger group of people to an expert role (a combination of knowledge of many people improve the quality of the knowledge base, and make the expert system will work better than a single expert);
ι) mentally resistant (expert system will operate without interruption, even under stressful conditions);
φ) knowledge base that can be easily expanded as experience is gained;
κ) have the ability to explain the found solutions to problems;

The process of creating expert systems can be based on a specialized programming language (eg Prolog language) or created on the basis of skeletal expert system. Using the skeletal system, the main task is to acquire and formalize the relevant expertise in the field. As a result, the knowledge accumulated in the system converts the skeletal system used in an appropriate expert system.

3. Scope of the research

The construction of an expert system that supports the processes of information systems implementation, will be based on the knowledge stored in the knowledge base, based on data obtained through a survey. The survey includes a set of threats that have found in the reports of The Standish Group [9].

This group since 1985 collects information about IT projects carried out in enterprises of all sizes with a number of industries including banking, industry, trade and services, health care and education. It provides reliable diagnoses uses of ICT systems and forecasts of future trends. Report prepared on the basis of research based on the conduct of interviews, which included 365 small, medium and large companies using 8380 of systems.

Table 1 contains a sample set of risks identified in the report, The Standish Group [9], which have been isolated over the years. The responses will be used to prepare the knowledge base on the basis of data obtained from respondents.

Table 1. Sample list of risks of failure that may occur during system implementation

Lp.	Name of the risk
1	Lack or misspelled defined goals ERP system implementation, tailored for the requirements of "strong" department
2	Lack of support project by the Board
3	Wrong choice of system or suppliers
4	Lack of experience in designing contracts
5	Duty use the law of public procurement by an organizational unit
6	Lack of knowledge of product on customer side and lack of competence on the supplier side
7	Lack of knowledge if the system meets requirements for safety and formal regulations-legal (lack of knowledge of whether the system will be able to take into account the polish realities)
8	Lack of knowledge of current and final economic processes (absence of a centralized and structured organization of knowledge management on the progress of their business processes. Lack of documentation (descriptions) and mapping (flowcharts) business processes. No description of the current 'AS-IS' and the target (the implementation of the system) 'TO-BE'. difficulties in obtaining information / knowledge in the analysis of processes)
9	Inadequate (lack of performance, or performed as a minimum) rebuilding process BPR (Business Process Reengineering)
10	Lack of design methodology (lack of measurable business goals and measures of success evaluation of the project)

Source: own based on reports of The Standish Group

4. The concept of the system

As an expert system platform used skeletal system PC-SHELL, which is part of the package SPHINX [5]. All information collected in the process of acquiring knowledge, will be stored in the knowledge base. Stored in the database domain knowledge is declarative in nature (is in the form of rules and facts). The method used in the forward inference is based on the rule:

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rules > facts > goal
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Modeling of expert system will be carried out on the basis of the skeleton, whose architecture is shown in Figure 1.

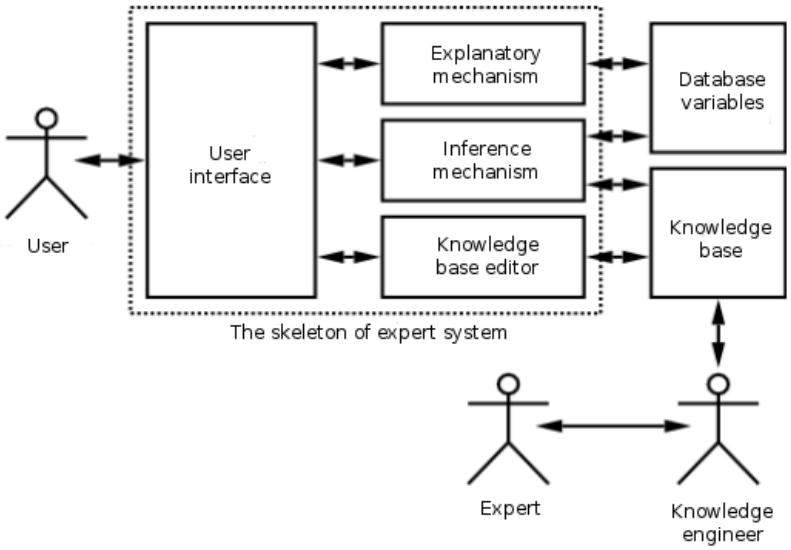

Figure 1. Architecture of an expert system modeled

The presented architecture of expert system comprises five main components [2]:

a) Knowledge base - contains information obtained from experts in the process of accumulation of knowledge (facts and rules of reasoning). Information is stored in a knowledge base in a declarative way in accordance with prescribed regimens;
b) requesting module - used in the process of inference all collected procedures;
c) explanatory module - allows step-by-step presentation of rules and facts (the reasoning), which enables to generate proposals;
d) module of collection of knowledge (knowledge base editor) - is used to collect domain knowledge, acquired from the experts;
e) User Interface - is used for communication between the user of the system, both in the process of knowledge acquisition as well as a presentation and explain how to fix the problem;

Interface module occupies a central role in the dialogue between the user and an expert system. On the one hand serves as a tool for knowledge acquisition, the other as a mechanism to present the results of the process of inference for users and provide for their understanding.

The proposed system supporting the implementation of information systems should consist of: an expert system, the knowledge base in the form of text files, and - in the case of system expansion with additional mechanisms - neural network

module (responsible for supporting the process of inference). Knowledge base will be supplemented by information obtained in the survey of companies with developed IT infrastructures.

The task of the expert system will support the team of implementation of information system. At each stage of the implementation will be possible to obtain a scenario of conduct to minimize the occurrence of the risk of failure of system implementation. As a result of the responses we get a conclusion on the likelihood of the correct completion of the project or the risk of its failure. After receiving the solutions it is possible to obtain information on the indications of the failure of the implementation of an IT project, and the statements to eliminate the cause of the failure.

5. Summary

Information Systems from year to year will be more and more complex, and the implementation process even more complicated. A key element of the implementation will be able to take on any stage right decisions that will allow to bring the whole process of implementation by the end of achieving the objectives posed at the beginning.

The proposed expert system can be used as a decision making tool for managers and project managers, supervising the implementation of information systems. The main advantages of the system, above all, the opportunity to acquire expertise in the dialogue process user - system. It is planned to make further development of modules statements based on neural networks, which will further improve the accuracy of the expert advice.

REFERENCES

[1] Beardon C. (Ed.) (1989), *Artificial Intelligence Terminology – a reference guide*, Wiley, New York.

[2] Bubnicki Z. (1990), *Wstęp do systemów ekspertowych*, PWN, Warszawa.

[3] Duch W. (1997). *Fascynujący świat komputerów*. Wydawnictwo Nakom, Poznań.

[4] Gołuchowski J. (2007), *Technologie informatyczne w zarządzaniu wiedzą*, Prace Naukowe UE, Katowice.

[5] Michalik K. (2006), *Zintegrowany pakiet sztucznej inteligencji SPHINX 4.5. Podręcznik inżyniera wiedzy*, AITECH – Artifical Intelligence Laboratory, Katowice.

[6] Nafkha R. Olejniczak M. (2013) „ Ewaluation of the relationship between time and cost of system implementation against chosen problems associated with implemented Project" Computer Algebra Systems in Teaching and Research, Vol. IV, No 1.

[7] O'Brien J.A. (1990), *Management Information Systems, A Managerial End User Perspective*, Irwin, Homewood Ill, Boston.

[8] Siegel Wiktor (2012), *Wdrożenia we mgle, Raport na temat zarządzania zmianą w Polsce*, Door Group.

[9] The Standish Group (1995) The CHAOS Chronicles, Standish Group, West Yarmouth, Massachusetts, Styczeń 1995, http://www.standishgroup.com/sample_research/chaos_1994_1.php