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# An IT Project Risk Management Knowledge Base

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**Abstract.** *In the theses, a knowledge-based risk management model for IT projects that provides a logical mechanism for knowledge-based systems is described.*

**Keywords.** *Information Technology, Risk Management, Knowledge Management, Expert System, Knowledge Base.*

## INTRODUCTION

Modern IT projects are implemented under conditions of uncertainty and are highly susceptible to risks because of dynamic changes in requirements and immaterial deliverables. The international risk management standard ISO 31000:2009 defines uncertainty as “the state, even partial, of deficiency of information related to, understanding or knowledge of an event, its consequence, or likelihood” [1]. Accordingly, the reduction of uncertainty requires relevant information, or knowledge, about processes and events that can affect project objectives. This is particularly important for IT projects that are knowledge intensive.

The principles and tools of effective use of knowledge are developed within the knowledge management discipline, which “promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise's information assets” [2].

In recent years, numerous approaches concerning the integration of knowledge management with project management and risk management were proposed [3-5]. In addition, in the publications, the term “knowledge base” (an organized repository of knowledge consisting of concepts, data, objectives, requirements, rules, and specifications) is frequently mentioned.

However, the current approaches do not specify the logic of the expert and decision

support system as a component of the project knowledge base. Therefore, it is necessary to develop a knowledge-based risk management model for IT projects that provides a logical mechanism for knowledge-based systems.

## KNOWLEDGE BASE

The expert system's logic for the IT project risk management knowledge base is shown in figure 1.

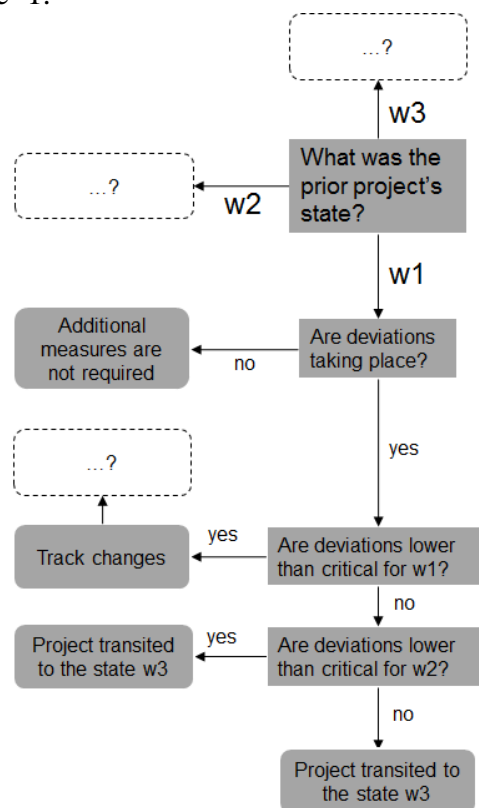


Figure 1 – Expert system's logic

In order to prioritize knowledge-based risk management procedures in IT projects, it is proposed to use the buffer management concept. The depletion of the project's buffer, which is composed from safety time extracted

from individual tasks compared to the project's progress shows the overall level of project risk. Thereby, buffer management can be used to signalize that the current risk level requires obtaining additional information from stakeholders for further analysis and taking risk response measures.

The expert system's logic is based on the project's transitions between certain states depending on the buffer consumption rate compared to the project's progress. In terms of buffer consumption rate, the project at a certain moment of time can be in one of three states: w1, w2 or w3.

According to the division into states, the following rules can be formulated.

1. In the state w1, negative deviations either don't occur or don't exceed the critical level for w1.

1.1. If deviations don't take place, additional measures are not envisaged.

1.2. If deviations in the state w1 take place but do not exceed the critical level, it is necessary to track the consequent changes in the project.

1.3. If deviations exceed threshold values for w1, the project has transited from the state w1 to w2 or w3 since the last observation

2. In the state w2, deviations that may affect the project's success negatively take place.

2.1. The project's being in the state w2 requires planning new or complementing measures stipulated by the plan with respect to minimization of deviations and returning the project to the state w1.

2.2. If deviations are lower than immanent to the state w2, the project has transited to the state w1.

2.3. If deviations are higher than critical for the state w2, the project has transited to the state w3 since the last observation.

3. In the state w3, deviations negatively affecting the project's success are present.

3.1. The project's being in the state w3 requires taking measures concerning

minimization of deviations and returning the project to the state w2 or w1.

3.2. If the deviations are lower than immanent to w3, the project has transited to the state w2 or w1.

To represent the knowledge in the knowledge base, it is proposed to use the CLIPS language. CLIPS, though being simple, provides comprehensive toolset including procedural, rule-based and object-oriented components.

The system has the property of subadditivity, i.e. it can be complemented with new rules if necessary. Based on specific information about the causes, factors and conditions of risk occurrence, the chains of questions and responses continue until the specific recommendations are provided.

## CONCLUSIONS

The use of the knowledge-based risk management system provides a highly adaptive mechanism of identifying and responding risks occurring in a dynamic IT project environment. With the use of knowledge management techniques, the level of uncertainty in the project is reduced within an iterative process involving the feedback from stakeholders (tacit knowledge) and performance indicators based on project execution.

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