

Risk analysis in requirements engineering for the diagnostic systems

Summary

Author: Marcin Amarowicz MSc, Eng.

Supervisor: prof. Wojciech Cholewa, PhD, DSc Eng.

Silesian University of Technology, Faculty of Mechanical Engineering

The presented PhD thesis deals with the problems of designing of the project of diagnostic systems for technical objects. In general case, this issue is difficult to implement, due to the need to take into account in the design process of many different factors, such as the results of risk analysis or existing limitations. The main goal of the conducted research, was the development of such design approach, that allows for consideration of these factors in the design process.

It was assumed, that this task can be achieved by introducing to the standard design approach one additional phase, during which the formal notation of the project needs will be performed. This notation contains an information about expected functionalities of the diagnostic system as well as the set of potential subsystems that implemented them. Based on such written project need, it is possible to generate a set of potential solutions of the project of the diagnostic system. In the further stage, an optimal solution will be selected from them.

For the purpose of recording the project need in the formalized way, the sets of requirements, that are commonly used in software engineering area, was used. The special notation of requirements, that takes into account all aspects of considered problem was proposed. The optimization process of the project of diagnostic system, has been carried out through a developed expert system. The optimization process was based on the gathered project knowledge and has been implemented as an inference process in the appropriate graphical models.

For the purposes of carrying out the proposed project approach, the specialized application, so called *Requirements editor*, was implemented. Through this application it is possible to carry out most of the steps of proposed design approach.

Practical verification of the proposed design approach, covered the implementation of a part of diagnostic system project for a typical technical object. The research stand FESTO S7 Edu-Trainer Compact, through which it is possible to implement common industrial processes, was considered as this object. For this technical object, the necessary sets of functional requirements and diagnostic rules was gathered. Then, they were evaluated through the prism of their suitability for achieving by the designed diagnostic system the assumed goals. Then it was generated a set of potential solutions of the diagnostic system and the optimal solution was selected. The analysis of the results allowed to confirm the rightness of the assumed theses.

Keywords:: diagnostic systems, technical risk, expert system, requirements

Science domains: design and maintenance of machinery, technical diagnostics, artificial intelligence, requirements engineering