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SURIYAN SUNTONG : AN APPLICATION MODEL OF SOFTWARE RELIABILITY BY FUZZY LOGIC. THESIS ADVISORS : SUPHACHAI TANGWONGSARN, Ph.D, THANWADEE THANITSUKKARN, Ph.D. 122 P. ISBN 974-663-224-8

The purpose of this thesis was to evaluate software reliability and criticality using an application model of software reliability by fuzzy logic. There are two models, a fuzzy software reliability model and a fuzzy criticality analysis model, combined in the application model. The first is a proposed fuzzy software reliability model (FSRM). It uses fuzzy or possibilistic methodology to deal with the time interval between software failures, which are taken as the fuzzy variables governed by a membership function. The second is the fuzzy criticality analysis model. It can be considered an adaptation of Failure Modes, Effects and Criticality Analysis (FMECA), whose inputs are severity and possibility of failure (from FSRM), by using fuzzy rule base as the core of the model.

These two models are prototyped and implemented in this study. The proposed FSRM prototype performs prediction of the time to failure using synthesized data and various software reliability data from several software reliability centers. This data is used to compare the results with the existing models; Cai's FSRM, Littlewood-Verrall, Musa Basic, Musa-Okumoto and Jerinski-Moranda model. The proposed fuzzy criticality analysis model prototype is implemented in the real world software system, in an electronic manufacturing company as a case study, which includes more than thirty components, in order to improve the overall system reliability and criticality.

The results of the first model's application show that the accuracy of the prediction is comparative with the other models. The experimental results of the second model show that the software components and the overall software criticality and reliability improved continuously in the eight week period of the study.

It can be concluded that the objectives of this thesis have been met. A higher accuracy in software reliability prediction was gained, even with imprecise failure data. Moreover, the causes, effects and appropriate corrective actions can be identified and prioritized effectively. By using the approach in this study.