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A MODEL AND ITS ALGORITHM FOR SOFTWARE REUSE OPTIMIZATION PROBLEM WITH SIMULTANEOUS RELIABILITY AND COST CONSIDERATION

Zhiqiao Wu[1], Jiafu Tang[1], Chun Kit Kwong[2] and Ching Yuen Chan[2]

[1]Department of Systems Engineering
Key Lab of Integrated Automation of Process Industry of MOE
Northeastern University
No. 11, Lane 3, Wenhua Road, Heping District, Shenyang 110819, P. R. China
wuzhiqiao@hotmail.com; jftang@mail.neu.edu.cn

[2]Department of Industrial and Systems Engineering
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong, P. R. China
{ mfckkong; mfcychan }@polyu.edu.hk

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Abstract. *In this paper, a model is proposed where the cost and reliability of activities of reuse-based development can be predicted or measured, and all possible reuse scenarios can be analyzed and compared to support the selection of alternative scenarios. A scheme of typical reuse mode is designed from the perspectives of application engineering and domain engineering activities. According to the scheme, six reuse modes are addressed from the sequences of activities. Alternative industry reuse scenarios can be derived from the modes. An optimization model is proposed that can assist decision-makers in selecting a reuse scenario for minimizing cost, maximizing reliability and satisfying system requirements. To solve efficiently the bi-objective 0-1 integer programming involved in the model, a new algorithm is presented that can find the entire set of efficient solutions.*
Keywords: Software reuse, Reuse models, Optimization models, Bi-objective programming problems, Efficient solution

1. **Introduction.** In recent years, a significant number of efforts have been spent on techniques and methods to define the "grain" of software reuse components, such as the recent research on Software Product Line (SPL) [1,2]. However, selecting an appropriate set of components to satisfy the functional and non-functional requirements of a system is difficult. The task is dependent on the experience, especially on the non-functional requirements such as cost and reliability. Non-functional requirements are important to develop a successful software application. As shown by Tomer [3], software reuse is not merely a technical issue. The organizational challenges of software reuse outweigh the technical questions. The functional properties of component assemblies are usually easier to model and validate compared with non-functional properties. The reuse activities in software design should be systematically measured or estimated, and alternative reuse scenarios should be evaluated and compared for effective support of the whole reuse process. However, only a few methodologies were developed to support the automation of an assembly process on the non-functional requirements. Many selection models of reuse strategy are aimed to address the issue of systematically increasing the efficiency of software reuse [4-7]. Very few studies provide a method for precisely analyzing and evaluating alternative scenarios of various reuses. Therefore, a systematic framework of