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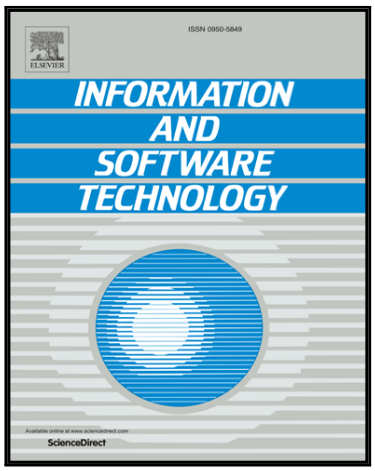

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Investigating Styles in Variability Modeling: Hierarchical vs. Constrained Styles

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Abstract

Context: A common way to represent product lines is with variability modeling. Yet, there are different ways to extract and organize relevant characteristics of variability. Comprehensibility of these models and the ease of creating models are important for the efficiency of any variability management approach.

Objective: The goal of this paper is to investigate the comprehensibility of two common styles to organize variability into models – *hierarchical* and *constrained* – where the dependencies between choices are specified either through the hierarchy of the model or as cross-cutting constraints, respectively.

Method: We conducted a controlled experiment with a sample of 90 participants who were students with prior training in modeling. Each participant was provided with two variability models specified in Common Variability Language (CVL) and was asked to answer questions requiring interpretation of provided models. The models included 9 to 20 nodes and 8 to 19 edges and used the main variability elements. After answering the questions, the participants were asked to create a model based on a textual description.

Results: The results indicate that the hierarchical modeling style was easier to comprehend from a subjective point of view, but there was also a significant interaction effect with the degree of dependency in the models, that influenced objective comprehension. With respect to model creation, we found that the use of a constrained modeling style resulted in higher correctness of variability models.

Conclusions: Prior exposure to modeling style and the degree of dependency among elements in the model determine what modeling style a participant chose when creating the model from

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