

A Meta-model for Requirements Engineering in System Family Context for Software Process Improvement Using CMMI

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Abstract. Software industries are pursuing the development of software intensive systems with a greater degree of re-use, reduction of costs, and shorter time to market. One of the successful approaches taken is based on the development of sets of similar systems where development efforts are shared. This approach is known as System Families. This article discusses an important issue in system family engineering activities: requirements modelling in system family context. The requirements must contain both the common and variable parts. Also, functional and non-functional aspects have to be considered in system family approach. Besides, an organization framework must be taken into account for requirements management. Some meta-models for these issues in system family are proposed and discussed. Based on the proposed model, a process for requirements management and development according to CMMI practices has been created.

1 Introduction

For many years, software industries have been trying to achieve the development of software intensive systems with a greater degree of re-use, cost reduction, and shorter of time to market. System Families (SF) are considered to be one of the most successful approaches to carrying it out. It focuses on the reduction in the time to market and development costs through the provision of a set of elements that are common to a number of systems. An SF is therefore a set of systems that share a significant part of the development effort; since they share many elements. It is

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sensible to think that the concepts behind them are also common¹. The main goal of this article is to present one approach to the requirements modelling and management in system families. In addition, Capability Maturity Model Integration (CMMISM) is taken as a base for improvement of software process.

The basic work behind the results presented here has been carried out within the CAFÉ [1] and FAMILIES projects. The CAFÉ reference framework (CRF) provides a guide to classifying the activities and models related to SF development. It is based on the model used in the ESAPS project; in addition, it is enhanced [1]. In summary, CRF can be divided into two main parts CAFÉ Process Reference Model (CAFÉ – PRM) and CAFÉ Assets Reference Model (CAFÉ - ARM). In Fig. 1 CAFÉ-PRM is shown. The objective of this model is to represent major activities and methods operating on the core assets, to allow the mapping of the contribution/tools against a common reference. In the upper part we found Application Engineering, its main purpose is to obtain products based on assets. In the lower part we found Domain Engineering, its main purpose is to develop the assets of the SF. And, in the middle part, we found those elements that support both Application and Domain Engineering. Our research work is aimed at solving problems in the transition from Domain Analysis to Application Analysis and the reverse.

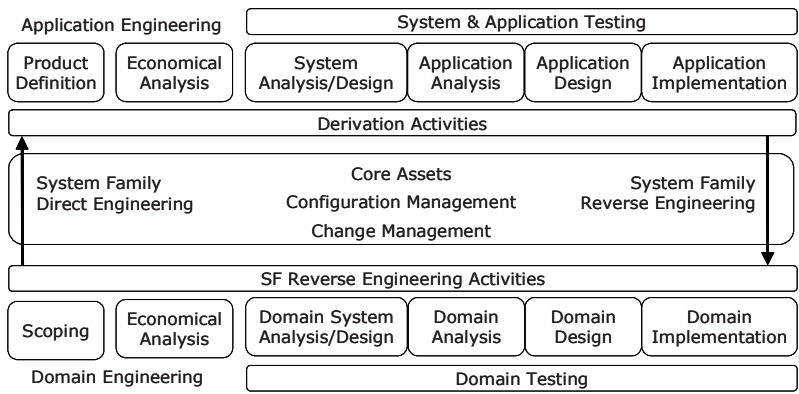


Fig. 1. CAFÉ Process Reference Model

The rest of the paper is organized as follows. In the next section, we present a general review of the most important related work. In addition, we outline the current issues that we found throughout all the most important work in this arena. In section 3, we present the paper of the requirements with respect to SF engineering organizations. In section 4, we show the present our requirements meta-model and its connection with CMMI. In section 5, we present our requirements development and management process, its support by means of our developed tool and a short outline of a project assessed by it. Finally, in section 6, we conclude with some remarks and future research.

¹ Some authors do distinguish between “product line”, “product family” and “system family”. We will use them interchangeably.