Process Line Configuration: An Indicator-Based Guidance of the Intentional Model MAP

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Abstract. Variability has proved to be a central concept in different engineering domains to develop solutions that can be easily adapted to different organizational settings and different sets of customers at a low price. The MAP formalism has a high level of variability as it is expressed in an intentional manner through goals and strategies. However, a high level of variability means a high number of variation points. A process customization is then required to offer a better guidance. The Product lines have appeared with this management of variability and customization. Furthermore, we propose the Process line concept to represent the processes that may be customized to a given project. Our goal is to enhance the Map guidance by specifying the *MIG* (*M*ap *I*ndicator-based *G*uidance) approach. We suggest several guidance approaches based on an indicators' typology. We illustrate our proposal with an example from the requirement engineering field.

Keywords: Indicator, MAP, Process guidance, Process line, Configuration.

1 Introduction

Over the decades, variability in Software Engineering has become increasingly important. At the beginning, a system met the purpose of a single organization and of a simple set of customers, whereas nowadays, a system must be conceived in a larger perspective, to meet the purpose of several organizations and to be adaptable to different usage situations and customer sets [1]. The variability is the ability to be subject to variation. As a result, the notion of software variability is defined as the ability of a software system to be changed, customized or configured to a specific context [2]. Whereas the software community studies variability as a design problem and concentrates on implementation issues [4] [5] [6], we believe like [7] that capturing variability at the goal level is essential to meet the multi-purpose nature of these new information systems. They incorporate variability in the functionality that they provide and are able to self adapt to the situation at hand.

The increasing variability in software engineering has led to the establishment of the concept of *Product lines*. Product line engineering is a paradigm to develop software applications using platforms and mass customization, which means that the commonalities and the differences in the applications of the product line have to be modeled in a common way [3]. As a Product may be envisioned as a specific customization of a

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Product line, a Process may also be seen as a specific customization of a *Process line*. This ability to derive a process configuration from common characteristics in a repeatable manner is based on the variability of the process models. This runtime configuration increases the context-awareness of the processes. Configurable process models has already been put forward in [8]. This kind of models is defined by combining similar business process models within a family, thus creating process variability. The process family is then configured to fit the requirements of specific organizations or projects. However, [8] aims at creating configurable processes in the particular field of business process management.

In our proposition, we use methodological process models which already have a high level of variability as they are goal-oriented. Goal modeling has been found to be an effective way for identifying requirements of software systems by focusing on understanding the intentions of the involved stakeholders [9] [10]. The process model MAP [1] [11] is an example of goal model conceived to meet this challenge. A Map expression provides a synthetic view of the process variability in an easy way to understand. Variations are revealed in two ways, by the gradual movement down the different levels of a top map, and by the alternative paths available at a given map level [1]. [12] detailed this intrinsic variability of the MAP model.

A high level of variability creates an increased need for guidance. As the engineer go through its process, he reaches variation points where more information is needed to make further decisions. An enhanced version of the MAP model has been described in [13] with the integration of weight values in order to use the graph theory for Map guidance. In our proposal, we suggest a more complete Map Indicator-based Guidance (MIG) approach, which aims at enhancing the MAP guidance by representing it as a configurable process within the Process line concept. The MIG approach has three main properties: (i) it is viewed as a decision-making problem; (ii) it includes the context indicators typology, and (iii) it suggests different kind of guidance based on indicators. Firstly, as the Map model has an intentional nature, it requires decisions in its navigation. Secondly, an indicator typology is suggested for making guidance decisions. This typology is adapted to the MAP model, with indicators deduced from either the Map arguments or the project situation. Thirdly, MIG contains three approaches allowing different guidances based on the proposed typology. The MIG approach increases the context-awareness with the use of context indicators which express runtime information about the project at hand. These indicators guide the engineer during the process execution and help him to select the more adequate path in a Map, i.e. to configurate his process. This dynamic configuration allows having slightly different process instances, based on external settings, from the same process model.

The MAP process line is described in Section 2. Section 3 defines the process line configuration and Section 4 specifies the approaches to use it. We conclude in Section 5.

2 The MAP Process Line

The MAP model has been introduced in the Information System Engineering domain [11] and validated in several fields, as requirement engineering [14], method engineering [15] or process modelling [11]. Maps are representations of processes. As process models, they can be compared to the various types of process modeling languages and