The Tetrads Influences: A Case Study of an Adaptable Software Configuration Management Process

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ABSTRACT

The Software Configuration Management (SCM) process with its origin in hardware development was first applied to the software development environment in the 1950’s. Since then many IT dynamics associated with this process have evolved, such as, software development methodologies, software process improvement standards, computing environments, and organizational needs. Through the observation of these IT dynamics, which the researchers called “the tetrad influences”, it is now apparent that there is a need to look into new adaptable approaches to apply the SCM process for traceability and governance. In this paper, we will present a conceptual framework highlighting the tetrad influences on the SCM process and will propose a Software configuration Adaptable Lean Agile Management “SALAM” model as a solution. We contribute a case study of a large Australian IT project where hybrid project teams delivered a consolidated software product in a hybrid cloud computing environment.

Keywords: Adaptable Environment, Agile Software Development, Cloud Computing, Governance, Lean, Lean Thinking, Model, Software Configuration Management, Tetrad, Traceability

INTRODUCTION

Gone are the days when the Software Configuration Management (SCM) process with its basis in hardware development was first applied to the classical standalone software development environments in the 1950’s. In such environments, software changes used to follow the sequential approach using software development methodologies, such as, waterfall and spiral models etc.

With radical advancement in software tools, technologies, and development techniques in the last six decades, the software engineering paradigm also got shifted in four important ways: 1) software development methodologies (for example, RAD, agile software development methodologies, and open source software development methodologies); computing environments (for example, parallel computing, grid computing and cloud computing); improvement standards (for example IEEE, ITIL, PMP, Prince2); and organization needs for traceability and governance regardless of their size (Durrani, Richardson, & Lenarcic, 2013).
This article uses the term “tetrad influences” (as shown in Figure 1) to represent the impact of these four IT dynamics on the SCM process. In order to realize the benefit of the SCM process under the tetrad influences, an adaptable SCM approach is required that uses lean thinking principles and the associated lean tools (Appleton & Berczuk, 2003; Appleton & Cowham, 2008; Poppendieck, 2011).

In this paper, we will present a conceptual framework to illustrate the tetrad influences on the SCM process and will then propose an adaptable SCM model called “SALAM” (Software configuration Adaptable Lean Agile Management) aligned with the conceptual framework. We will also contribute a case study of a large Australian IT project, where we implemented the SALAM model under the tetrad influences (consisting of hybrid project teams using both agile and plan driven methodologies in a hybrid cloud computing environment).

This paper is structured as follows: In the background section, we describe key concepts, and terminologies associated with the conceptual framework. Then we present our conceptual framework and will propose the SALAM model in alignment with the conceptual framework. We will then present our case study including motivation, research methodology, execution, and results and we will conclude in the last section.
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