ABSTRACT

Context: The amount of software in solutions provided in various domains is continuously growing. These solutions are a mix of hardware and software solutions, often referred to as software-intensive systems. Companies seek to improve the software development process to avoid delays or cost overruns related to the software development.

Objective: The overall goal of this thesis is to improve the software development/building process to provide timely, high quality and cost efficient solutions. The objective is to select the origin of the components (in-house, outsource, components off-the-shelf (COTS) or open source software (OSS)) that facilitates the improvement. The system can be built of components from one origin or a combination of two or more (or even all) origins. Selecting a proper origin for a component is important to get the most out of a component and to optimize the development.

Method: It is necessary to investigate the component origins to make decisions to select among different origins. We conducted a case study to explore the existing challenges in software development. The next step was to identify factors that influence the choice to select among different component origins through a systematic literature review using a snowballing (SB) strategy and a database (DB) search. Furthermore, a Bayesian synthesis process is proposed to integrate the evidence from literature into practice.

Results: The results of this thesis indicate that the context of software-intensive systems such as domain regulations hinder the software development improvement. In addition to in-house development, alternative component origins (outsourcing, COTS, and OSS) are being used for software development. Several factors such as time, cost and license implications influence the selection of component origins. Solutions have been proposed to support the decision-making. However, these solutions consider only a subset of factors identified in the literature.
Conclusions: Each component origin has some advantages and disadvantages. Depending on the scenario, one component origin is more suitable than the others. It is important to investigate the different scenarios and suitability of the component origins, which is recognized as future work of this thesis. In addition, the future work is aimed at providing models to support the decision-making process.

Keywords: Component-based software development, component origin, decision-making, snowballing, database search, Bayesian synthesis.