Filtering COTS Components Through an Improvement-Based Process*

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Abstract. Typically, COTS evaluations embody a first stage intended to determine rapidly which products are suitable in a target context. This stage – called "filtering" or "screening" – chooses a set of alternatives to be considered for more detailed evaluation. For successful filtering processes, composers increasingly focus on closing the gap between required and offered functionality, hence reducing ambiguity of information for comparison. In this paper, we introduce a filtering process, which is based on early measurement of functional suitability of COTS candidates. Measures are immersed in a Six Sigma-based process aiming at improving the filtering process itself as well as its deliverables.

1 Introduction

The adoption of COTS-based development brings with it many challenges about the identification and finding of candidate components for reuse. The search is generally driven by evaluation criteria defined at different levels or as part of an iterative process, in which the preliminary analysis of the current system is an important source for criteria definition [10].

However, the first part in the identification of suitable COTS candidates is currently carried out dealing with unstructured information on the Web, which makes the evaluation process highly costing when applying complex evaluation criteria. Currently, empirical studies indicate that the necessity of formal processes for evaluation depends on the context, but the results also confirm the necessity of accelerating the identification and filtering of candidates [14,20].

Identification of COTS candidates is a complex activity itself. It implies not only dealing with an impressive number of possible candidates but also with unstructured information that requires a careful analysis. In this context, the proposal in [12] sug-

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gests extending the identification stage with a learning phase, which provides support to the COTS component discovery process. As a different and possibly complementary approach, other proposals use description logics to develop an ontology for matching requested and provided components [4,18]. Some other approaches try to measure the semantic distance between required and offered functionality [1,13] but these measures usually need detailed information as input to the calculations.

In addition to learning and classification issues, a filtering process is concerned with the pre-selection of candidates. It actually takes place by matching several properties of COTS components, including some inexact matching. Moreover, there are some cases where goals cannot be entirely satisfied without considerable product adaptation and other cases where these goals must be resigned to match product features [2,11].

As a possible improvement, in [19] the Six Sigma approach has been suggested selecting packaged software; however the evaluation mainly relies on the information provided by demos and additional documentation of the software. Then, the lack of measures makes this process perfectible.

Our Six-Sigma based approach focuses on fact-based decisions and teamwork, which might drive the identification and filtering process by using specific measures [6]. Particularly, we consider functional suitability as the main aspect to be measured; however, measures should be expressed in such a way that calculation is possible at early stage. Additionally, our process might be extended by classifying and standardizing information for analysis, building upon some recent works on this field.

In section 2 of the paper, we introduce our process for filtering, which is described in terms of its main activities. Specific techniques and measures are referred in that context. Then, section 3 discusses some insights of the process. Finally, section 4 addresses conclusions and topics for further research.

2 An Improvement-Based Process for Filtering

Six Sigma is typically divided into five phases, creating what is referred to as DMAIC, which is an acronym for the following phases [19]:

1. *Define* the problem and identify what is important: Identify the problem and the customers; define and prioritise the customer's requirements; and define the current process.
2. *Measure* the current process: Confirm and quantify the problem; measure the various steps in the current process; revise and clarify the problem statement, if necessary; and define desired outcome.
3. *Analyse* what is wrong and potential solutions: Determine the root cause of the problem; and propose solutions.
4. *Improve* the process by implementing solutions: Prioritise solutions; and develop and implement highest benefit solutions.
5. *Control* the improved process by ensuring that the changes are sustained: Measure the improvements; communicate and celebrate successes; and ensure that process improvements are sustained.