

On Goal-Oriented COTS Taxonomies Construction*

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Abstract. This paper proposes the adoption of a goal-based method called GBRAM for facilitating the process of building taxonomies of COTS components. Since GBRAM was defined in a different setting, the main result of the paper is to adapt it to this new context obtaining the GBTCM method. We show how the different activities and artifacts of GBRAM change, and we apply the proposal to obtain a taxonomy for requirements engineering oriented tools.

1 Introduction

The use of Commercial Off-The-Shelf (COTS) components (hereafter, COTS) as parts of larger systems has grown steadily [1, 2]. The process of developing systems from COTS is an economic and strategic need in a wide variety of different application areas. As a result, a huge amount of COTS have become accessible in the market. This gives raise to a new problem: how to organize the knowledge about these COTS in such a way that searching the market becomes a feasible task.

In [3] we proposed to use *taxonomies* as a way to organize the COTS market (see fig. 1) and we applied the proposal to the family of business applications. At the leaves of the taxonomy there are *COTS domains*; a COTS domain encloses a significant group of functionality (e.g., the domain of anti-virus tools or mail servers systems). Domains are grouped into *categories* (e.g., the category of communication infrastructure systems or financial packages), which may be grouped at their turn. We proposed the use of *characterization attributes* [4] to discriminate among different categories or domains. We bind questions and answers to these attributes as a way for browsing the taxonomy. Dependencies among domains that belong to the taxonomy are included in the hierarchy itself (e.g., mail server systems depend on anti-virus tools to support integrity). As an additional point, we also bind *quality models* to nodes in the taxonomy, each describing the quality factors that are of interest for the particular category or domain; quality models are inherited downwards the taxonomy.

Although the main ideas of the proposal were satisfactory enough for our purposes, it turned out that the way to identify the discriminating characterization attributes

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(which capture the relevant information for discriminating categories and domains) was not properly defined. In [3], we just took an existing taxonomy as starting point and rearranged it by observation. This was clearly a weak point of our proposal, and therefore we started to look for a better suited strategy.

In this paper, we use the notion of *goal* as introduced in the context of requirements engineering [5, 6] as the rationale to identify characterization attributes and therefore COTS categories and domains. In general, goals are very stable with respect to changes, and goal refinement provides a natural mechanism for structuring and exploring many alternatives in the COTS market. Our main contribution in this paper is to present a goal-based reasoning method based on the *Goal-Based Requirements Analysis Method* (GBRAM) proposed by Annie I. Antón in the field of software requirements [7] to the context of COTS taxonomies. The resulting method, *Goal-Based Taxonomy Construction Method* (GBTCM), help us to generalize, formalize, enhance and clarify the process of building taxonomies by identifying and evaluating the most suitable characterization attributes. We apply GBTCM to a particular segment of the COTS market: systems and tools for supporting the various activities embraced by the requirements engineering phase. The resulting taxonomy can be considered as another contribution of this work.

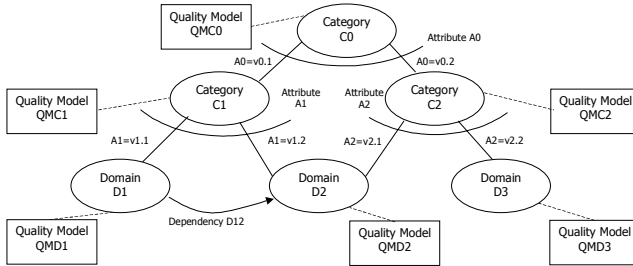


Fig. 1. The fundamental elements of COTS taxonomies

2 The Goal-Based Requirements Analysis Method (GBRAM)

GBRAM was formulated with the transformation of enterprise and system goals into requirements as primary focus, more specifically to assist analysts in gathering software and enterprise goals from many sources and to support the process of discovering, identifying, classifying, refining, and elaborating goals into operational requirements. The method's main contribution is the provision of heuristics and procedural guidance for identifying and constructing goals.

The two high level phases of GBRAM briefly explained are:

- **Goal Analysis.** Concerns the exploration of available information sources for goal identification followed by the organization and classification of goals.
- **Goal Refinement.** Concerns the evolution of goals from the moment they are first identified to the moment they are translated into operational requirements.