Chapter VIII

Broker Performance for Agile/Virtual Enterprise Integration

Paulo Ávila
Polytechnic Institute of Porto, Portugal

Goran D. Putnik
University of Minho, Portugal

Maria Manuela Cunha
Polytechnic Institute of Câvado and Ave, Portugal

ABSTRACT

The implementation of the virtual enterprise (VE) model requires an agent, called a broker, who undertakes several functions and whose increased performance contributes to the searched agility of this organisational model. From the set of functions that the broker can provide to the VE, there are some that may explicitly contribute to the process of VE integration. One of the processes that contributes to VE integration, either in the project phase, during the resources system configuration, or in the operation phase, when the system reconfiguration is required, is the resources system selection process. We will approach, in this work, the importance of the broker in the resources system selection through the comparison of his performance in that process to the performance expected of the VE itself, if the person for whom it is responsible (or principal) performs the same process. This comparison is made based on the simulation results obtained from a numeric demonstrator specifically constructed to quantify the time and cost of the selection process for both the selectors (the broker and the principal). We demonstrate that the domain of advantage for the broker, i.e., where the broker’s performance exceeds the principal’s, grows with the dimension of the tasks plan and with the number of preselected resources, and also with the complexity of the selection method.
INTRODUCTION

Virtual enterprises, that concept related to the distribution of competencies (services) by different resources, that are integrated with the aim of developing a business, have appeared in the literature as organisational models capable of satisfying the new market requisites and, principally, the requisite of rapid adaptation, i.e., flexibility if the system answer is reactive or agility if the answer is proactive. We believe in that, but they need means and resources that perform tasks of project (configuration and resources system reconfiguration, i.e., integration) and of operation with high effectiveness and efficiency.

We all have the perception that VE can bring better performance, in some domains, than the conventional production systems, that is why there exist indicators that the enterprises tend to find new forms of intercollaboration. According to the VOmap project, “in 2015 most enterprises shall be part of some sustainable collaborative networks that will act as breeding environments for the formation of dynamic virtual organizations in response to fast changing market conditions” (Camarinha-Matos & Afsarmanesh, 2003, refereed in Camarinha Matos & Abreu, 2003).

There are studies, some more optimistic than others, but according to the works that we have analyzed, to refer to some (Gebauer, 1996; Agrawal & Graves, 1999; Ávila, 1998; Leimeister, J. et al., 2001; Putnik & Ávila, 2002), nobody denies that there exists room for that organizational model. However, the success of each production system (PS) does not depend only on the organizational model that is adopted in each time. This is why it will be expected that different cases of VE present different performances like in the conventional models. Our perspective is that the VE models that incorporate the broker’s services have higher potential to build more agile VE, or if we prefer, agile/virtual enterprises (A/VE).

In this work, we will present the broker as one of the elements that can contribute to improving the performance of VE integration process, namely, through his better ability to select the resources that will integrate the VE. First, we will make an analysis to the brokers’ models that are proposed in the literature in order to justify his necessity in the process of integration and operation of VE, but especially in the selection process. After, we propose a resources selection model for the broker, and over that, we introduce a demonstrator that was developed. With this demonstrator, numeric, resorting to simulations, we will show that as the system to integrate is more complex, i.e., how larger the dimension of task plan is, the larger is the number of preselected resources; and how complex the selection method is, the higher is the broker’s importance in undertaking the selection process.

BROKER’S INDISPENSABILITY IN THE VE MODEL

Several authors justified that the broker can improve the performance of virtual enterprises, but the main justifications have appeared to the electronic markets, and that can be seen as a particular case of VE.

In Resnick et al. (1994), the broker’s value is justified by costs reduction, privacy improvement both for the consumer and for the supplier, larger and better information
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