Chapter VI

BM_Virtual Enterprise: A Model for Dynamics and Virtuality

Goran D. Putnik
University of Minho, Portugal

Maria Manuela Cunha
Polytechnic Institute of Cávado and Ave, Portugal

Rui Sousa
University of Minho, Portugal

Paulo Ávila
Polytechnic Institute of Porto, Portugal

ABSTRACT

BM_virtual enterprise (BM_VE) is a virtual enterprise (VE) in a total or partial conformance with the BM_virtual enterprise architecture reference model (BM_VEARM). BM_VE is a kind of VE characterized as a dynamically reconfigurable network integrated over the global domain, satisfying the requirements for integrability, distributivity, agility, and virtuality as competitiveness factors. BM_VE uses three main mechanisms, or tools: market of resources, broker, and virtuality. This chapter presents the three fundamental mechanisms for the VE reconfiguration dynamics and virtuality; introduces the basic concept of the BM_VEARM, which serves as the conceptual and formal base for building BM_VE instances; shows the formal specification and theory of the structural aspects of the BM_VE as well as some aspects of the BM_VE reconfiguration dynamics; presents the BM_VE as an agile/virtual enterprise (A/VE); and finally, describes some important consequences of virtuality in BM_VE, i.e., that the BM_VE structure is hierarchical, a new definition of the VE (in which the network as the VE characteristic is irrelevant from the operational unit’s point of view), and the process of a “traditional” enterprise virtualization.
INTRODUCTION

BM_virtual enterprise (BM_VE) is a virtual enterprise (VE) in a total or partial conformance with the BM_virtual enterprise architecture reference model (BM_VEARM) developed in the literature (Putnik, 2001). BM_VE is the VE as a dynamically reconfigurable network integrated over the global domain, satisfying the requirements for integrability, distributivity, agility, and virtuality as the competitiveness factors. BM_VE uses three main mechanisms, or tools: market of resources, broker, and virtuality. Virtuality as a tool is a specific organizational structure pattern that contributes to further improvement of agility/reconfiguration dynamics.

The objective of this chapter, in the context of this volume, is to present a VE model for which the requirements for integration organization and technology solutions are very demanding [due to the inherent high (organizational) reconfiguration dynamics, virtuality (as its implementation is conceived), and other related semantic, pragmatic, and societal problems-for more detailed discussion on the integration problems for VE, see Putnik et al., this volume], for which the integration science and engineering should provide a new generation of solutions. In this text, as the representative of the highly demanded VE models, the BM_VE model is presented.

Thus, in spite of some proposals by the authors toward the VE integration solutions, e.g., the normalized virtual enterprise (NVE) model (NVE model investigation is at an initial stage and deals only with a part of the VE integration problem “space”), this presentation of the BM_VE model should be seen, first, in the context of this volume, as the presentation of the functional requirements for the VE integration solutions to be proposed and to be considered.

The chapter is organized as follows. The first part presents briefly the three fundamental mechanisms, or tools, for the VE reconfiguration dynamics and VE virtuality. The second part introduces the basic concept of the BM_VEARM, which serves as the conceptual and formal base for building BM_VE instances. The third part shows the formal specification and formal theory of the structural aspects of the BM_VE as well as some aspects of the BM_VE reconfiguration dynamics. The fourth part presents the BM_VE as an A/VE. In the fifth part, some important consequences of virtuality in BM_VE are described, i.e., that the BM_VE structure is hierarchical, a VE new definition (in which the network as a VE characteristic is irrelevant from the operational unit’s point of view), and the process of a “traditional” enterprise virtualization. Finally, the chapter finishes with the sixth part-Conclusions and References.

THREE TOOLS FOR DYNAMICS AND VIRTUALITY

Market of resources (MR), the first mechanism, or tool, that BM_VE uses, is an institution, or enterprise, that serves as a meta-enterprise of the operating VE. In other words, MR is an environment to support the VE dynamic integration, operation, and reconfiguration, as well as “boost” the networking (VE) dynamics, providing a way to overcome (i.e., minimizing) the two fundamental networking disablers: “transaction,” i.e., reconfigurability and cost, and the VE partners’ knowledge and rights protection. On the first view, MR looks like a common marketplace that offers marketplace functionalities,