

Chapter V

Technologies to Support the Market of Resources as an Infrastructure for Agile/Virtual Enterprise Integration

Maria Manuela Cunha

Polytechnic Institute of Cávado and Ave, Portugal

Goran D. Putnik

University of Minho, Portugal

Joaquim Pereira da Silva

Polytechnic Institute of Cávado and Ave, Portugal

José Paulo Oliveira Santos

University of Aveiro, Portugal

ABSTRACT

The agile/virtual enterprise (A/V E) model is considered a highly dynamic version of the virtual enterprise (VE) model, and its implementation presents several requirements in order to keep the VE partnership aligned with the market, that is, with business. Such requirements include (1) the reduction of reconfiguration costs and effort, and (2) the capability to preserve the firms' private knowledge on products or processes. These must be assured by a specific environment, or, in other words, by organizational infrastructures as a meta-organizational structure for VE design (or integration) and operation, such as the Market of Resources—an environment developed by the authors to cope with the highlighted requirements, and assuring a better performance than the traditional environments such as the Internet search engines or the electronic marketplaces. The chapter describes the functionalities of the Market of Resources and explains how does it supports A/V E integration, and addresses some technologies that could support

A/V E integration within the Market of Resources, namely XML/ebXML and Webservices. The chapter proposes an architecture to support the operation of the Market of Resources, representing a fusion of the peer-to-peer (P2P) architecture with the client-server architecture, as a variant of P2P architecture. Also, a laboratory implementation of the web services for manufacturing is presented too.

INTRODUCTION

Most definitions of virtual enterprise (VE) incorporate the idea of extended and collaborative outsourcing to suppliers and subcontractors, in order to achieve a competitive response to market demands (Webster, Sugden, & Tayles, 2004). As suggested by several authors (Browne & Zhang, 1999; Byrne, 1993; Camarinha-Matos & Afsarmanesh, 1999; Cunha, Putnik, & Ávila, 2000; Davidow & Malone, 1992; Preiss, Goldman & Nagel, 1996), a VE consists of a network of independent enterprises (resource providers) with reconfiguration capability in useful time (or, in other words: in real-time), permanently aligned with the market requirements, created to take profit from a specific market opportunity, and where each participant contributes with its best practices and core competencies to the success and competitiveness of the structure as a whole. Even during the operation phase of the VE, the configuration can change, to assure business alignment with the market demands, traduced by the identification of reconfiguration opportunities and a continuous readjustment or reconfiguration of the VE network, to meet unexpected situations or to keep permanent competitiveness and maximum performance (Cunha & Putnik, 2002, 2005a, 2005b).

A particular model characterized by a high reconfiguration dynamics capability is the agile/virtual enterprise (A/V E) model (Cunha & Putnik, 2005b; Cunha & Putnik, 2006a, 2006b; Putnik, 2001; Putnik, Cunha, Sousa, & Ávila, 2005).

The implementation of the VE model should assure the required reconfiguration dynamics,

which, as we will see in the chapter, is dependent on (1) the reduction of reconfiguration (“transaction”) costs and effort, that is, requires a balancing between reconfiguration dynamics and reconfiguration time and costs and (2) the capability to preserve the firms’ private knowledge on products or processes.

The formation, integration and operation of A/V E relies on the existence of an adequate platform of information and communication technologies. The environment for creation, integration, operation, reconfiguration and dissolution can be implemented under the format of a Market of Resources, an entity conceived to cover the whole A/V E life cycle (Cunha & Putnik, 2005d; Cunha, Putnik, & Ávila, 2004; Cunha, Putnik, Gunasekaran, & Ávila, 2005). The market offers several business models that already provide a reasonable part of the characteristics of the A/V E model and of the Market of Resources. The electronic marketplaces implement several functionalities identified in the Market of Resources, and the emergent technologies that tend to be consolidated in the implementation of electronic marketplaces can be fundamental also in the implementation of the Market of Resources.

In the first part of the chapter we discuss the VE reconfiguration dynamics requirements and present the Market of Resources as the indispensable environment for enabling VE reconfiguration dynamics, that is, as a tool for managing, controlling and enabling networking and dynamics in VE integration, and the related supporting IT platform architecture.

Based on the organization of the Market of Resources, that is, in its general principles, processes, procedures and operation rules, as well

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