

Towards Conflict-Free Virtual Enterprises

Ejub Kajan

State University of Novi Pazar, Serbia

Nanjangud C. Narendra

Cognizant Technology Solutions, India

Zakaria Maamar

Zayed University, UAE

INTRODUCTION

Electronic Commerce (EC) represents one of the major development forces in most economies. EC has survived major turmoil due to Electronic Data Interchange (EDI, 1980s) adoption and “dotcom” boom (1990s). After disillusionment and failure analysis, EC has molded itself into a new model known as Business-to-Business (B2B). In the B2B model there is a lot of heterogeneity between business processes, supported applications, and associated data on the one side and different hardware, operating systems, database systems, network infrastructure, etc. on the other side, that constitute a major barrier to the success of EC (Kajan, 2011; Otto, et al., 2013; Rezaei, et al., 2014). Similar situation is taking place inside companies where Application-to-Application (A2A) integration by 2016 will cost middle to large companies 32% more than in 2013¹.

When we take a quick look into the past forty years, the initial idea of paperless businesses has been modified many times, following the push-pull principle. In other words, every time a technology meets a business’s needs, the business sets up new goals. This push-pull behavior between applications’ requirements and technology achievements is known in all areas of IT, but EC seems a leading driver to call for a new cycle. However, new trends are underway. The recent efforts on social networking in business process management (Maamar, et al., 2013), for example, show that new technology may be a driver for EC improvement as well.

With the advent of globalization many organizations look for new partners to reach common goals to improve, for example, production rate, increase market share, refine supply chain, etc. Such new networked organizations are known as Virtual Enterprises (VEs). In a VE it is unlikely that any single partner will decide on the infrastructure, applications, and/or processes to be used. Instead, knowledge sharing around common goals and retaining the autonomy of each partner is crucial. This article is an overview of the main obstacles facing VEs, a critical assessment of existing approaches to achievements across VEs, and recent research efforts in order to mitigate conflicts.

VIRTUAL ENTERPRISE

Most organizations are now modeled according to the principles of Service Oriented Architecture (SOA) for the sake of improving efficiency, agility, and response to changing market needs. SOA supports the integration of several enterprises into an entity usually known as a VE by exposing these organizations’

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capabilities as services (Huhns & Singh, 2005). A VE possesses the following characteristics (Narendra, et al., 2013): (i) it is formed for a specific service-oriented process execution (for short- or long-term), and may dissolve once that execution is done; (ii) it is dependent on the nature of the interactions among the participating organizations; (iii) it is typically formed via a joint alignment of strategies among the participating organizations; and (iv) since the participating organizations are autonomous, conflicts would definitely arise.

Traditionally, organizations have been modeled using Enterprise Architecture (EA) models. Several EA frameworks exist such as CIMOSA (Kosanke & Zelm, 1999), TOGAF², Zachman in industry (Zachman, 1977); ArchiMate³, SEAM in academia⁴, and international standards such as RM-ODP (Farooqui, et al., 1995). EA captures the whole vision of an organization in terms of both business and Information Technology (IT) resources. In an EA (Cuenca, et al., 2006; Zachman, 1977) the goal is to align the business and IT resources in order to improve the competitiveness of the enterprise.

Running Example

We model a VE as per the 3-layered approach introduced in (Narendra, et al., 2013). The topmost layer known as strategy represents the following: business goals that the VE must fulfill and policies and business rules of the VE and its participating entities (referred to as Business Entities (BE)) that need to be taken into account while fulfilling the goals. The next lower layer is known as operational, representing the business services (Le, et al., 2010) that each partner offers, and that are an abstraction of the actual process and service implementations that form the bottom layer, i.e., the service layer. The service layer is the IT realization of the abstract concepts in the upper two layers, and represents the actual operations executed and data exchanged.

For illustration purposes our running example refers to CarMan, a car manufacturer with three partners (Figure 1): SupSt and SupTy are suppliers of steering wheels and tires, respectively, while Ship is a shipper that transports the completed cars. Together they form a (part of a) VE for manufacturing cars.

At the strategy layer, the common goals of the VE would be “Car Manufacture” and “Manufactured Car Shipment”, which would also be the goals for CarMan. For SupSt, its goals could be “Steering Wheel Manufacture” and “Steering Wheel Delivery”. For SupTy, its goals could be “Tires Manufacture” and “Tires Delivery”. In order for the VE to be successful, those goals of each participating entity that pertains to the VE should be derivable from the common goals of the VE.

The above business goals are then mapped onto the appropriate business services at the operational layer by the designer of the VE. Some business services for CarMan could be “Car Manufacturing” and “Car Shipment”. For SupSt, some business services could be “Steering Wheel Manufacturing”, “Steering Wheel Testing” and “Steering Wheel Shipment”. While the former two would be directly derived from the goals of SupSt, the third business service would need to be directly linked to “Manufactured Car Shipment” goal. This is because delivery of steering wheels is a necessary condition for shipping the finished product, i.e., the car.

For CarMan one of its business rules could be R1 = “If order amount for any shipment is greater than \$1 million, choose lowest cost shipper; else choose Ship”, whereas a business rule for SupSt could be R2 = “Choose Ship for all shipments.” A business rule for SupTy could be R3 = “If order amount between \$100,000 and \$250,000, choose Ship; else choose the lowest cost shipper.”

The existence of these businesses can give rise to conflicts. For example, from the viewpoint of SupSt, its “Steering Wheel Shipment” business service would be affected by its R2 of choosing Ship

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