

## Chapter 5.14

# A Conceptual Framework for Business Process Modeling in Virtual Organizations

**Dimitris Folinas**

*University of Macedonia, Greece*

**Tania Pavlou**

*City University (London), UK*

**Bill Karakostas**

*City University (London), UK*

**Vicky Manthou**

*University of Macedonia, Greece*

### ABSTRACT

Among different approaches in business processes modeling procedure are those in virtual and dynamic organizational environments. In this chapter, a conceptual framework for modeling business processes in virtual organizations is suggested, by introducing Web services technology. Web services can be the business enabler for the new organizational form, which is particularly well suited to meet the demands arising from today's turbulent changes in the firms' environment. The proposed framework consists of several steps in a bottom-up approach, aiming to support the modeling and coordination of the complex and shared business processes in the examined environment.

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### INTRODUCTION

As Internet reduces interaction costs between enterprises and the establishment of partnerships is considered a mean to achieve short-term economic benefits and to gain long-term competitive advantages, the demands for creating virtual organizations are increasing. A virtual organization (VO) is a temporary or permanent association of geographically dispersed organizations communicating with each other and / or triggering services that carry out some complex workflow of transactions (Browne & Zhang, 1999; Bultje & Jacoliene, 1998; Camarina-Matos & Afsarmanesh, 1999; Palmer & Speier, 1997; Papazoglou, Ribber, & Tsalgatidou, 2000; Pfohl & Buse, 2000; Timmers, 1999; Van Aken, 1998). VO is more than collaboration between

organizations. It integrates the core competencies and special abilities of its members in order to respond rapidly both to the global market and customer requirements (Huang, 2004) and has unique characteristics: lack of geographical boundaries, the absence of informational barriers, form fluidity, cooperative and instant partnerships capability, exceptional speed and agility and a unity of appearance.

Researchers and practitioners both in conventional and virtual environments are describing business entities in terms of processes rather than functional hierarchies. Generally, a business process can be defined as a set of one or more linked and partially ordered activities, which collectively realize a specific business goal (Davenport & Short, 1990). According to Scheer (1993) a business process is the occurrence of some duration that is triggered by an event and results into another event. In a VO virtual environment business processes are distributed and shared (Folinas, Manthou, & Vlachopoulou, 2003; Huang, 2004). The basic implication of this characteristic is that all network partners have a common realization of interenterprises business processes, in order to ensure the seamless materials, information and financial flows of transactions. Thus, the concept of VO refers to the activities of procurement, order fulfilment, product design and development, distribution, delivery, shipping and customer service, planned, executed and controlled by two or more separate organizations aiming to fulfil customers' orders.

Business process modeling is considered an effective tool for designing and managing an enterprise. Luo and Tung (1999) have classified process modeling objectives into three main categories: (1) communication among partners by achieving common understanding and representation of shared business processes, (2) identification, analysis and improvement of existing business processes, and (3) control and monitoring of business processes. Furthermore, Hammer, and Champy, (1993), and Grover, Fiedler, and Teng

(1994), argued that three well-known and widely accepted strategic approaches are based on process modeling: Business process reengineering, enterprise integration and enterprise engineering.

During the last decades many approaches to support business process modeling have introduced initially for a single enterprise, such as IDEF0 (Mayer, Benjamin, Caraway, & Painter, 1995), IDEF1, IDEF1X, IDEF3 (Mayer et al., 1995), RAD, REAL, Dynamic Modeling, Object-Oriented Modeling, MAIS, CIMOSA, as well as, in virtual environments (Camarinha-Matos & Pantoja-Lima, 2001; Chang-Ouk & Nof, 2000; Dong & Chen, 2001; Jensen, 1994; Van der Aalst, 1999; Van der Aalst & ter Hofstede, 2000). Lin et al. (2002), have presented process-modeling methods in the literature and compared them in different dimensions. While there is a rapidly growing body of literature in process modeling techniques only few studies have been proposed to support new and innovated practices and technologies (Presley, Sarkis, & Liles, 2000). We suggest that Web services have the potential to become an effective approach to support the modeling and coordination of the complex and shared business processes in VO.

The advantageous properties of a VO depend on the modeling of business processes, which defines the form of the interpretation of messages/documents and services passing through VO partners. To achieve this goal certain heterogeneity difficulties need to be overcome. Integrating business partners requires integration between their business activities defining a formal way to express business objects and data vocabularies. Additionally, different operating systems and information platforms need to be connected and enabled to communicate.

In this chapter, a Web services-based conceptual framework to model VO's distributed business processes and interaction relations among them are proposed. The proposed framework consists of several steps in a bottom-up approach aiming to support the design, development and deploy-

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