

Chapter 39

Architectural Model for Supply Chain Orchestration and Management

Marijn Janssen

Delft University of Technology, The Netherlands

INTRODUCTION

In a global economy, organizations are increasingly geographically dispersed, which means that the coordination process becomes increasingly complex and information-intensive. Conducting transactions and carrying out online business requires information sharing and supply chain coordination. An efficient and effective coordination of supply chains becomes increasingly important with competition taking place more and more at the level of supply chains, rather than at the level of individual organizations. Consequently, success in creating and maintaining a competitive advantage depends on the reconfiguration of supply chains.

Although organizations participating in a supply chain are becoming increasingly aware of the opportunities and threats of Information and Communication Technology (ICT) when it comes

to improving coordination with their supply chain partners, organizations whose core business does not involve ICT and supply chain management often lack the knowledge and experience needed to coordinate of supply chains. In this respect, Supply Chain Coordinators (SCC) and Supply Chain Orchestrators (SCO) play a pivotal role in providing the means to automate and manage the coordination of supply chains (Hagel-III, Durchslag, & Brown, 2002). These specialized organizations can provide the necessary services and support to enable the creation and operation of supply chains.

Organizations increasingly find that, if they are to compete successfully in a global market and networked economy, they must rely on effective supply chains formed in networks (Hagel-III, Durchslag, & Brown, 2002). In recent decades, globalization, outsourcing and all kinds of information and communication technologies have enabled many organizations to operate solid collaborative networks in

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which each specialized business partner focuses on a limited number of key strategic activities.

From a system point of view, a complex network structure can be decomposed into individual components, which in turn need to be coordinated to operate in concert (Fan, Stallaert, & Whinston, 2003). In such a network, complimentary resources are provided by a number of cooperating and sometimes competing companies. One of the main advantages for companies cooperating in a network is the ability to deliver products by selecting the resources and appropriate companies that are able to deliver the service elements that are required. The aim of networks is to provide a range of products that individual organizations are unable to offer. In this chapter, we discuss the role of SCO, with the aim of deriving an architectural model for the integration of the activities of organizations in the supply chain. The architecture model is illustrated and evaluated using a case study.

BACKGROUND

In literature, the concept of orchestration is discussed with great frequency, taking on a variety of different forms and names. Examples of central entities that perform coordinating tasks within networks range from ‘supply chain coordinator’ (Marijn Janssen, 2004), ‘virtual value chain orchestration’ (Hinterhuber, 2003) and ‘value chain or business network orchestrator’ (Hagel III, 2002) in the business domain, to ‘process orchestrator’ (Marijn Janssen, Gortmaker, & Wagenaar, 2006) and ‘Network Administrative Organizations’ (NAO) (Milward & Provan, 1995) in the public domain. Dhanaraj and Parkhee (2006) use the term ‘network orchestration’, which they define as “the set of deliberate, purposeful actions undertaken by the hub firm as it seeks to create value (expand the pie) and extract value (gain a larger slice of the pie) from the network”. In essence, orchestration is aimed at connecting to consumers

by coordinating the interdependent activities of (semi-)autonomous departments or agencies.

Because SCO is a continuously changing field, its roles and functions are not clear, but several attempts have been made to define a set of organizational roles. Hagel et al. (2002) identify seven roles: 1) select and recruit partners, 2) create incentives for participation and specialization, 3) define standards, 4) compose tailored supply chain processes, 5) take responsibility for the end product, 6) create feedback loops for learning, 7) cultivate understanding of processes and practices to improve quality. while Janssen et al. (2006) distinguish eight roles: (1) initiator and enabler, (2) developer, (3) standardization, (4) control and progress monitoring, (5) facilitator, (6) service and product aggregator, (7) accountability and (8) process improvement. Typically, these roles can be translated into functions and tasks that are necessary to orchestrate a supply chain. Typically, the introduction of orchestration requires a reengineering of business processes and a transformation of the supply chain structure.

Nowadays, many organizations use web services to provide customers access to their information. Web services are self-contained and encapsulate some kind of functionality (Fremantle, Weerawarana, & Khalaf, 2002). The interaction pattern among services is a known as Service-Oriented Architecture (SOA), in which a service is a well-defined and self-contained function that does not depend on the context or state of other services. Web service technology uses a loosely-coupled integration model that enables a flexible integration of heterogeneous systems in a variety of domains.

Web service orchestration is a viable technology when it comes to automating supply chains and can be used to create alliances among partners and connect organizations to the loosely coupled business processes of network partners (Tewoldeberhan & Janssen, 2008).

Figure 1 shows the position of the SCO and the use of services. Creating a supply chain begins

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