Chapter 1
A Framework and Architecture for Performance Management in Virtual Organizations

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ABSTRACT

Virtual organizations are becoming common in the new world of work characterized by modern data exchange capabilities. These organizations face new challenges in information sharing that traditional approaches cannot address. This research proposes a framework and architecture for providing performance data to partners in virtual organizations. The framework aligns the activities of partners in a virtual organization at three different layers and defines common performance measurement indicators at each layer. It also proposes an implementation architecture that enables inter-organizational performance management in collaborative environments. The proposed architecture is validated through a prototype developed using IBM business process and business intelligence products.

INTRODUCTION

In recent years, organizational forms known as collaborative networks (CNs) have emerged that are information driven and characterized by extensive multi-partner arrangements in complex value chains and global business ecosystems (Camarinha-Matos, 2009). Within the CN category, a subtype referred to as a Virtual Organization (VO) has been noted. One of the distinguishing features of a VO is that it

shares resources among multiple partners to respond to temporary opportunities (Camarinha-Matos, Afsarmanesh, Galeano, & Molina, 2009). This type of organization is important because it provides a means for partners to collaborate to quickly seize opportunities, but managing the multiple alliances involved has proven to be a challenge (Graser, Jansson, Eschenbacher, Westphal, & Negretto, 2005).

An essential prerequisite for effective VO management is the availability of performance data emanating from the activities of the various partners involved. Yet, each of the partners is autonomous, each has information that it may not want to share especially given that the VO is a temporary alliance. How then, can the information needed to manage the VO effectively be provided while at the same time ensuring that the autonomy of each partner is respected?

Traditional performance management (PM) methodologies are designed to assess efficiency of intra-organizational processes. For example, approaches such as the Balanced Scorecard, Benchmarking, Six Sigma, and EFQM are generally appropriate for intra-organizational purposes (Graser, Jansson, Eschenbacher, Westphal, & Negretto, 2005). Although the SCOR model was developed by the Supply Chain Council to address interactions among organizations within a supply chain, it supports static and stable interactions and does not address the dynamic nature of VOs.

From the perspective of data sourcing and Business Intelligence (BI), several IT solutions such as extended Enterprise Resource Planning (ERP) systems have been proposed to specifically address inter-organizational coordination. These systems, however, are not flexible enough to adapt to rapid changes noted in most VOs. For instance, the goal of an extended ERP is to consolidate business functions throughout different systems of each business partner. The process of customization, implementation, and adoption of such systems is highly time and resource intensive. Once implemented, system change is difficult meaning that the flexibility needed by VOs to disband and reform as current opportunities are met and new ones emerge is difficult to achieve.

The Service Oriented Architecture (SOA) technology along with Business Process Management (BPM) approaches have been identified as a viable solution for integrating inter-organizational information systems in dynamic situations. Studies show that incorporation of SOA-based BPM with enterprise systems enables more standardized and flexible integration and management of different systems (Wang, Chu, & Xu, 2010). BPM provides the standardized business process modeling and management, while SOA enables flexible integration across various system components. Therefore, a dynamic solution suitable for VOs can be created based on an SOA infrastructure using the concept of services as a foundation for building business processes.

This paper introduces a PM framework for VOs that extracts key performance indicators from their SOA-based BPM collaboration infrastructure. The research follows the Design Science Research (DSR) methodology for information systems (March & Storey, 2008; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2008). This approach includes design, creation, and evaluation of IT artifacts intended to solve identified organizational problems. The rest of this paper is organized into 7 sections. Section 2 discusses the literature related to Collaborative Networked Organizations (CNOs), VOs, collaborative performance measurement, and reference frameworks for performance measurement. Section 3 addresses the concept of a Service Oriented Virtual Organization (SOVO) which is partially developed during this research. In Section 4, the proposed framework for collaborative performance measurement in a SOVO is outlined. The implementation architecture that enables aggregation and monitoring of collaborative performance from different sources of information is proposed in Section 5. To validate the proposed framework and

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