Networked Business Process Management

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ABSTRACT

In the current economy, a shift can be seen from stand-alone business organizations to networks of tightly collaborating business organizations. To allow this tight collaboration, business process management in these collaborative networks is becoming increasingly important. This paper discusses automated support for this networked business process management: automated means to manage business processes that span multiple autonomous organizations. The author starts this paper with a treatment of intra- and inter-organizational business processes to provide a conceptual background for business process management in business networks. The author describes a number of research approaches in this area, including the context of these approaches and the architectures of the automated systems proposed by them. The approaches are described from early developments in the field relying on dedicated technology to current designs based on standardized technology in a service-oriented context. The paper thereby provides an overview of developments in the area of inter-organizational business process management in the spectrum from simple, static business networks to complex, dynamic networks. The author observes that the described BPM research efforts move from pushing new BPM technology into application domains to using BPM to realize business-IT alignment in complex application contexts.

Keywords: *Automated Support, Business Networks, Business Process Management (BPM), Networks, Technology*

1. INTRODUCTION

Business process management used to be a rather internal issue for most organizations: organizations typically operated their business processes in a stand-alone mode without explicit connection to their business partners. Cooperation scenarios with other organizations obviously existed, but these scenarios were mostly based on the exchange of physical goods and information (e.g., on the basis of electronic data interchange) – not on the execution of integrated business processes by the collaborating partners.

Several developments have changed the context in which organizations collaborate, however. In the first place, products and services produced have become far more complex, thus requiring more business capabilities and hence larger networks of collaborating organizations (for example, Corswant and Fredriksson (2002) discuss this for the automotive industry). The fact that competition forces organizations to concentrate on core business activities only amplifies this development. Secondly, both product specifications and market circumstances have become much more dynamic,

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thereby requiring business networks to become more dynamic too. Thirdly, market paradigm changes like mass customization and demand chain orientation (see e.g. Verdouw et al. (2011)) require much tighter synchronized business processes across individual organizations in a business chain. Fourthly, time pressure has become much greater in the setup and execution of collaborations between organizations. These four developments are forcing organizations to pay much more attention to *how* they cooperate, not only to *what* they exchange. In other words: organizations are forced to co-operate in business processes that span business chains and take part in the design and management of these inter-organizational business processes.

To deal with the complexity of inter-organizational business processes and obtain the required efficiency in setting them up and executing them, automated systems are required for business process management in business networks. These automated systems should support a number of tasks. They should provide support for the design or configuration of inter-organizational business processes. As we will see in the sequel of this paper, support may be in the form of interactive design tools, but may also go into the direction of fully automatic configuration of inter-organizational business processes, based on predefined sub-processes within participating organizations. These automated systems should support the automated management of the execution of inter-organizational business processes, i.e., that process logic that actually links the internal business processes of multiple autonomous organizations. Then, these systems should support the synchronization of inter-organizational business processes with the internal business processes of the organizations.

This paper discusses the development of systems for business process management in business networks. Section 2 first provides a background by discussing the differences between intra-organizational and inter-organizational business processes. A three-level framework is explained that shows how to relate these two kinds of processes. Then, Section 3 discusses early approaches towards inter-organizational business process management. The next four sections present approaches, architectures and technologies of four major projects from the research experience of the author: CrossFlow, CrossWork, XTC and CoProFind. In doing so, attention is paid to both business process specification and business process enactment, including contractual and transactional aspects. The discussion in this paper explicitly shows the development from 'traditional' workflow management via advanced, structured inter-organizational business process management to service-based, highly dynamic business process interaction. The paper ends with a concluding section that presents an overall analysis of the discussed research projects and summarizes this in a number of trends.

2. INTER-ORGANIZATIONAL PROCESS CONCEPTS

In this section, we set the stage of inter-organizational business processes. We first discuss the concept of a business process within one organization: an intra-organizational business process. Then, we move to the concept of a business process across multiple organizations: an inter-organizational business process. We will see how control flow interfaces are important here. To explain how intra- and inter-organizational processes are related, we discuss a three-level framework. In the last part of this section, we add the aspect of dynamism to inter-organizational business processes, i.e., the aspect of collaboration networks that change over time. One thing is important to understand here: when we speak of 'organizations', these may be autonomous business entities (like commercial organizations) but also autonomous departments of a single business entity.