Chapter 29
Advanced Business Process Management in Networked E-Business Scenarios

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ABSTRACT

In the modern economy, we see a shift towards networked business scenarios. In many contemporary situations, the operation of multiple organizations is tightly coupled in collaborative business networks. To allow this tightly coupled collaboration, business process management (BPM) in these collaborative networks is becoming increasingly important. We discuss automated support for this networked BPM: automated means to manage business processes that span multiple autonomous organizations - thereby combining aspects of process management and e-business. We first provide a conceptual background for networked BPM. We describe a number of research approaches in this area, ranging from early developments to contemporary designs in a service-oriented context. This provides an overview of developments in which we observe several major trends. Firstly, we see a development from support for static business processes to support for highly dynamic processes. Secondly, we see how approaches move from addressing simple business collaboration networks to addressing complex networks. Thirdly, we find a move from the use of dedicated information technology to the use of standard technology. Finally, we observe that the BPM research efforts move through time from pushing new BPM technology into application domains to using BPM to realize business-IT alignment in application contexts.

INTRODUCTION

In the past, business process management (BPM) 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. Supply chains and service chains were often loosely connected from an operational perspective.

Several important developments have dramatically 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. A clear example is the automotive industry. Here, products have become increasingly complex (Maxton & Wormald, 2004) and consequently, business networks have become larger (von Corswant & Fredriksson, 2002). The fact that global 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, thereby requiring business networks and the processes they execute to become more dynamic too (Grefen et al., 2017). This is illustrated for example by Gartner stressing the importance of dynamic BPM for companies to deal with 'increasingly chaotic environments' (Gartner, 2010). Thirdly, business market paradigm changes, like mass customization (Vandaele & Decouttere, 2013) and demand chain orientation (Verdouw, Beulens, Trienekens, & Van Der Vorst, 2011) require much more tightly 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 - just-in-time behavior is becoming more important. 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 managing business process in business networks. These automated systems should support a number of tasks. They should provide support for the design and configuration of inter-organizational business processes. As we will see in the next sections 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. In the manufacturing domain, for example, the German Industrie 4.0 initiative (Germany Trade & Invest, 2014) illustrates this. These systems have the characteristics of both BPM and electronic business support. Depending on the dynamicity of the targeted application domain, the electronic business aspects become more prominent (this is for example very explicit in the CrossFlow project, which we discuss in a later section).

In the following, we discuss the development of systems for BPM in business networks. The next section 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, the following section discusses early approaches towards inter-organizational BPM. The next four sections present approaches, architectures and technologies of four major projects from the research experience of the authors: CrossFlow, CrossWork, XTC and CoProFind. In doing so, attention

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