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Guest editorial

Business process management: Where business processes and web services meet

1. Introduction

Over the last 15 years there has been a shift from "data-aware" information systems to "process-aware" information systems. To support business processes, an enterprise information system needs to be aware of these processes and their organizational context [2,7,6]. Hence, research on Business Process Management (BPM) has been focusing on systems that are driven by explicit process designs to enact and manage operational business processes. Such Process-Aware Information Systems (PAISs) allow for the modification of processes without changing the system itself (i.e., by reconfiguration). Traditionally, the process designs driving these systems are graphical and the focus is on structured processes that need to handle many cases. BPM can be considered as an extension of classical Workflow Management (WFM) systems and approaches.

PAISs can be classified into human-oriented and system-oriented. More precisely, PAISs may support Person-to-Person (P2P), Person-to-Application (P2A), and/or Application-to-Application (A2A) processes. In P2P processes the participants involved are primarily people, i.e., the processes primarily involve tasks which require human intervention. Job tracking, video-conferencing, project management, and groupware tools are designed to support P2P processes. At the other end of the spectrum, A2A processes are those that only involve tasks performed by software systems. Transaction processing systems, EAI platforms, and Web-based integration servers are designed to support A2A processes. P2A processes are those that involve both human tasks and interactions between people, and tasks and interactions involving applications which act without human intervention. Workflow systems fall in the P2A category since they primarily aim at making people and applications work in an integrated manner.

Within the BPM domain more and more researchers are focusing on various types of *analysis*. Classically, researchers have been focusing on verification and performance analysis based on process designs, i.e., models are analyzed before the corresponding processes are put into production. Interestingly, more and more work is being done on process mining and business process intelligence, i.e., on the analysis of business processes while they are being enacted, cf. www.processmining.org.

This special issue is based on the Third International Conference on Business Process Management (BPM 2005), organized by LORIA in Nancy, France, September 5–8, 2005. The interest in business process management (and in the BPM conference series) was demonstrated by the quantity and quality of the paper submissions to BPM 2005. We received over 176 contributions from 31 countries. Of these 176 papers, 25 were accepted as full papers (20 research papers and 5 industrial papers) for the conference. Moreover, 17 contributions were accepted as short papers [1]. The authors of the best papers were invited to submit an extended version to this special issue of DKE. Finally, after a careful selection and further revisions, we accepted the four papers included in this volume, i.e., of the 176 papers submitted, only four papers were selected after the various selection and reviewing rounds. In the remainder, we briefly introduce these four papers. However, before doing so, we would like to comment on the relationship between business processes and web services.

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2. Business processes and web services

Many papers presented at BPM 2005 focused on business processes and web services. Therefore, we would like to elaborate on relevance of web services for the BPM community.

Web services, an emerging paradigm for architecting and implementing business collaborations within and across organizational boundaries, are currently of interest to both software vendors and scientists [3]. In this paradigm, the functionality provided by business applications is encapsulated within web services: software components described at a semantic level, which can be invoked by application programs or by other services through a stack of Internet standards including HTTP, XML, SOAP, WSDL and UDDI. Once deployed, web services provided by various organizations can be inter-connected in order to implement business collaborations, leading to composite web services (i.e., service choreography and orchestration).

Today workflow management systems are readily available [2,7] and workflow technology is hidden in many applications, e.g., ERP, CRM, and PDM systems. However, their application is still limited to specific industries such as banking and insurance. Since 2000 there has been a growing interest in web services. This resulted in a stack of Internet standards (HTTP, XML, SOAP, WSDL, and UDDI) which needed to be complemented by a process layer. Initially, several vendors proposed competing languages, e.g., IBM proposed WSFL (Web Services Flow Language) building on FlowMark/MQSeries and Microsoft proposed XLANG (Web Services for Business Process Design) building on Biztalk. However, in recent years BPEL [4] emerged as a compromise between both languages.

The Business Process Execution Language for Web Services (BPEL4WS, or BPEL for short) has become the de-facto standard for implementing processes based on web services [4]. Systems such as Oracle BPEL Process Manager, IBM WebSphere Application Server Enterprise, IBM WebSphere Studio Application Developer Integration Edition, and Microsoft BizTalk Server 2004 support BPEL. Also organizations such as SAP support BPEL, thus illustrating the practical relevance of this language. Although intended as a language for connecting web services, its application is not limited to cross-organizational processes. It is expected that in the near future a wide variety of PAISs [5] will be realized using BPEL. Whilst being a powerful language, BPEL is difficult to use. Its XML representation is very verbose and only readable to the trained eye. It offers many constructs and typically things can be implemented in many ways, e.g., using links and the flow construct or using sequences and switches. As a result only experienced users are able to select the right construct. Several vendors offer a graphical interface that generates BPEL code. However, the graphical representations are a direct reflection of the BPEL code and are not intuitive to end-users. Therefore, BPEL is closer to classical programming languages than e.g., the more user-friendly workflow management systems available today. Both the software industry and researchers are working on mappings from more intuitive languages to BPEL.

In discussions, Petri nets [9] and Pi calculus [8] are often mentioned as two possible formal languages that could serve as a basis for languages such as BPEL. Some vendors claim that their systems are based on Petri nets or Pi calculus and other vendors suggest that they do not need a formal language to base their system on. In essence there are three ''camps'' in these discussions: the ''Petri net camp'', the ''Pi calculus'' (or process algebra) camp, and the ''Practitioners camp'' (also known as the ''No formalism camp''). This was the reason for starting the ''Petri nets and Pi calculus for business processes'' working group (`process-modelling-group.org`) in June 2004. Two years later the debate is still ongoing and it seems unrealistic that consensus on a single language will be reached. However, it is clear that web services and languages like BPEL are highly relevant for the BPM community as is reflected by the papers in the proceedings of BPM 2005 [1].

3. Papers in this special issue

As indicated in the introduction, this special issue contains four extended versions of papers presented at BPM 2005.

Tore Fjellheim, Stephen Milliner, Marlon Dumas, and Julien Vayssière report on a process-based methodology for designing event-based mobile composite applications. Starting point for their work is the observation that application developers should be able to specify how applications can adapt to changing conditions, and to later reconfigure the application to suit new circumstances. The paper describes a methodology that combines

the comprehensibility and manageability of control from process-oriented methodologies, with the flexibility of event-based communication. This enables a fine-grained adaptation of process-oriented applications.

Rania Khalaf presents an approach to go from RosettaNet PIPs to BPEL processes. RosettaNet Partner Interface Processes (PIPs) are mapped onto BPEL using a three-level approach. This is done to address the situation where business protocols in *n*-party interactions require centralized protocol design but decentralized execution without the intervention of the designing party. The general motivation for mapping PIPs to BPEL is twofold. First, it enables defining the message flows in PIPs in a standardized, portable, inter-operable manner. Second, PIPs currently have no way to factor in the interaction with back-end systems to reach an executable.

Richard Lenz and Manfred Reichert focus in their paper on IT support for health-care processes. Clearly, the health-care domain is an interesting application area for PAISs. Though health-care processes frequently change, and therefore the separation of the flow logic from the application code seems to be promising, workflow technology has not yet been broadly used in health-care environments. Therefore, Lenz and Reichert elaborate on the potential and the essential limitations of IT support for health-care processes using a broad sociotechnical perspective. Moreover, they indicate how advanced process management technology can improve the current situation.

Kees van Hee, Alexander Serebrenik, Natalia Sidorova, Marc Voorhoeve, and Jan van der Wal present new results on the resource management in the context of workflow nets, a special class of Petri nets. The authors present a scheduling-free resource management policy, i.e., the policy when a resource request may be granted whenever enough resources are available to satisfy the request. A business process consisting of any number of cases and working under the scheduling-free resource management policy is guaranteed to terminate properly if certain conditions are met. The paper also investigates the scheduling of resources based on solidification using an iterative simulation-based approach. An example inspired by the construction industry is used to illustrate the approach.

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