Chapter 7
Intelligent Agents for Business Process Management Systems

Janis Grundspenkis
Riga Technical University, Latvia

Antons Mislevics
Riga Technical University, Latvia

ABSTRACT

The chapter is focused on the usage of intelligent agents in business process modelling and business process management systems in particular. The basic notions of agent-based systems and their architectures are given. Multiagent systems as sets of multiple interacting software agents, as well as frameworks and methodologies of their development are discussed. Three kinds of architectures of agent-based systems – holons, multi-multi-agent systems and aspect-oriented architecture are described. Examples of already implemented agent-based systems in logistics, transportation and supply chain management are given. The chapter gives an insight into recent business process management systems and their architectures, and highlights several issues and challenges which underpin the necessity for agent-based business process management. Methodologies and implementation of agent-based business process management systems are discussed and directions of future research in this area are outlined.

INTRODUCTION

Recently business process management (BPM) systems are becoming more and more popular because only understanding and management of the whole set of business processes can provide success and competitiveness of organizations. The most characteristic feature of present time business processes is their change (they are not static),

as well as organizations should adapt to changes in their environment. That is why organizations are focusing on formalization of their business processes and start to implement BPM systems. The goal of BPM system is not only to ensure that individual employees are performing specific tasks in the specific order but also to provide information which helps business analysts to improve the effectiveness of processes in organizations (Chang, 2005; Smith, 2003). This is why the architecture of modern BPM systems is becoming more and more

complicated and the whole BPM system paradigm has changed. If the first systems were focusing on the software application itself, now the business process is the core.

A modern BPM system should not only provide tools for defining and executing processes, but also provide performance meter counters, management tools and support real time changes in processes (Chang, 2005). A BPM system should contain the whole set of tools to integrate with external systems through the variety of different protocols. Besides it should integrate with other BPM systems, and support cross-organization business processes (Smith, 2003). In addition, a modern BPM system should adapt to changes in the environment. This is where the intelligent agents can help. The use of agents in business settings does not have a long history. The most compelling applications of agent technologies are in business-to-business (B2B) domains. For example, during the week of 9-13 April 2007, some 31.7 percent of shares traded on the NYSE by volume were program-traded. Most of these will be trades undertaken by software agents (McBurney & Luck, 2007). This is one more B2B example from finance, in January 2007 Barclays Capital launched an automated, foreign-exchange currency fund, a software program that buys and sells forex automatically (McBurney & Luck, 2007). Another area where agent technologies are popular is transportation and logistics (Graudina & Grundspenkis, 2006). Intelligent agents represent organizations in logistics domain, model their logistics functions and expertise, and interactions with other organizations for solving such problems as coordination in supply chain management, dispatching of transportation orders, efficient management of container terminals, etc. Some publications (Belecheanu et al., 2006; Munroe et al., 2006) may be mentioned as related resources where commercial applications of agents are described. Several applications of different agent-based system architectures are discussed below. It is worth to stress that some results of research on

agent-based business processes and their management are also published, for instance, (Jennings et al., 2000; Pang, 2000; Yuhong, Zakaria, & Weiming, 2001; Grundspenkis & Pozdnyakov, 2006). Components of the modern BPM system are shown in Figure 1.

Implementing the BPM system in the organization is an iterative process. The standard waterfall software development model cannot be used to implement a BPM system, because it is nearly impossible to analyze and document all business processes that exist in the organization. In addition, as mentioned above, in the modern world business processes are changing rapidly – at the time business analysts have documented a process A, and start documenting a process B, the process A probably has already changed (NEXUM Insurance Technologies, 2005; Chang, 2005). That is why the only correct strategy of implementing the BPM system is an iterative development. In addition, it allows start using (and gain benefits from) the BPM system much earlier. In case of the BPM system it is also a significant advantage, because typically 20% of the business processes in the organization produce 80% of income (NEXUM Insurance Technologies, 2005). This means, that if a company implements only 20% of core processes and starts using the BPM system it gets a solid boost in productiveness in a short time. Figure 2 shows a complete BPM lifecycle. It consists of 5 stages: design, execution, control, analysis and improvement. The first two stages ensure business process management, while the other three – business intelligence (NEXUM Insurance Technologies, 2005).

ARCHITECTURE OF BPM SYSTEMS

The purpose of the BPM system is to automate manual work, improve information exchange among employees involved in business processes, control existing business processes and assist implementation of business process reengineering.

Related Content

Bounds in Tree-Based Approaches to Generate Project Portfolios in the Presence of Interactions
Rudolf vetscheraand Jonatas Araùjo de Almeida (2021). *International Journal of Decision Support System Technology (pp. 1-21).*
www.irma-international.org/article/bounds-in-tree-based-approaches-to-generate-project-portfolios-in-the-presence-of-interactions/287896

Intelligent Agents for Business Process Management Systems
Janis Grundspenkisand Antons Mislevics (2010). *Infonomics for Distributed Business and Decision-Making Environments: Creating Information System Ecology (pp. 97-131).*
www.irma-international.org/chapter/intelligent-agents-business-process-management/38419

A Multi-Criteria Decision Making Approach for ranking Business Schools
Dheeraj P. Sharma, Praveen Ranjan Srivastava, Ritanjali Panigrahi, Patanjal Kumarand Smita Joshi (2019). *International Journal of Strategic Decision Sciences (pp. 33-56).*
www.irma-international.org/article/a-multi-criteria-decision-making-approach-for-ranking-business-schools/236185

Creating a Data Lakehouse for a South African Government-Sector Learning Control Enforcing Quality Control for Incremental Extract-Load-Transform Pipe
Dharmesh Dhabliya, Vivek Veeraiah, Sukhvinder Singh Dari, Jambi Ratna Raja Kumar, Ritika Dhabliya, Sabyasachi Pramanikand Ankur Gupta (2024). *Big Data Quantification for Complex Decision-Making (pp. 88-109).*
www.irma-international.org/chapter/creating-a-data-lakehouse-for-a-south-african-government-sector-learning-control-enforcing-quality-control-for-incremental-extract-load-transform-pipe/344739

Decision Support System for Assigning Members to Agile Teams
Fernando Almeida, Diogo Adãoand Catarina Martins (2021). *Research Anthology on Decision Support Systems and Decision Management in Healthcare, Business, and Engineering (pp. 658-677).*
www.irma-international.org/chapter/decision-support-system-for-assigning-members-to-agile-teams/282610