

Challenges of smart business process management: An introduction to the special issue



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ABSTRACT

This paper describes the foundations of smart business process management and serves as an editorial to the corresponding special issue. To this end, we introduce a framework that distinguishes three levels of business process management: multiprocess management, process model management, and process instance management. For each of these levels we identify major contributions of prior research and describe in how far papers assembled in this special issue extend our understanding of smart business process management.

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1. Introduction

Today's business world is complex and characterized by an extensive division of labor. Products and services are designed and delivered with various actors being involved within the providing organization and beyond. In order to deliver products and services in a smooth way, it is of utmost importance that the coordination between the different actors inside and outside the providing organization is well defined. A first step towards a smooth operation is achieving transparency of the business process that results in product and service delivery. This transparency can be achieved by documenting the business process including the various actors involved, the activities they perform, the events and decisions that influence the progress, and the information that is produced and consumed [1,2].

Division of labor in business processes calls for coordination support by the help of information systems. The specific class of information systems that explicitly supports business processes is often referred to as process-aware information systems [3]. Office automation systems [4,5], workflow management systems [6,7], and recent business process management systems [1,2] all support process execution based on a specification of the process as a formal business process model.

Business process management is concerned with all management activities around business processes. In the past, activities in relation to business process management have been conducted by process analysts, process managers and process engineers in a labor-intensive fashion with hardly any automatic support except for generating the system configuration from the executable process model. This has been changing in recent years. Various smart techniques have been developed to automate or provide intelligent support for process stakeholders in various stages of business process management. This special issue provides ten excellent examples of these recent developments towards smart business process management. This editorial presents them in an overarching framework and connects them with the broader spectrum of recent contributions on smart business process management.

2. Business process management

In this section, we distinguish three different levels of business process management. Fig. 1 shows these three levels and their connections. The top level is often referred to as multiprocess management. It is concerned with the identification of the major processes of an organization and the regular evaluation of the priorities assigned to these processes. These activities interrelate with questions of strategic management and the overall process organization. The products of multiprocess management are often stored in a central process repository. The conceptual structure of this repository is also referred to as the process architecture.

The middle level is concerned with the management of a single process. The management activities on this level are often referred

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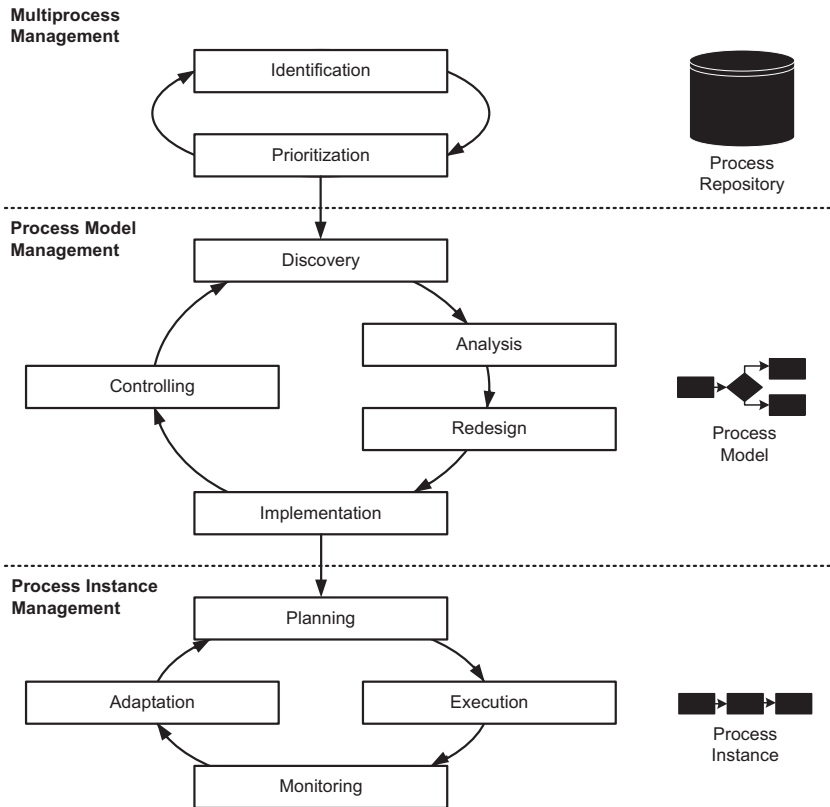


Fig. 1. Three levels of business process management.

to as the BPM lifecycle [1]. This lifecycle is started once a process is selected for redesign. First, this process is documented in the discovery phase resulting in an as-is process model. Second, the process is analyzed using qualitative and quantitative analysis techniques. In this way, weaknesses and issues can be uncovered. Third, different directions for redesign are investigated in order to fix the issues and generally improve the performance of the process. This yields a to-be process model as a specification of how the process is meant to operate in the future. Fourth, this to-be process model is taken into implementation. The corresponding information systems are designed or reconfigured and staff is trained to work according to the new setup. Fifth, once the process has been executed for a period of time according to the new design, process controlling checks to which degree performance and conformance objectives are met. Process mining can be used to extract knowledge about how the process operates

The focus of the bottom level is the management of singular process instances. Instances can be planned regarding when their activities are scheduled and which resources should be involved. With or without such a schedule, process activities are executed according to the rules defined in the process model. Process monitoring continuously checks rules such as quality-of-service assertions and trigger alerts if undesired behaviour is observed. Such alerts might be the reason for adapting the course of execution for an individual process instance.

Research into process mining [8] has resulted in various automatic analysis techniques that support different activities of business process management. We refer to them as smart business process management.

3. Smart business process management

The Oxford dictionary provides the following three connotations for smart: (i) being clean and tidy, (ii) showing quick-witted

intelligence and (iii) being quick.¹ All these meanings together have become prominent attributes of information technology and analysis techniques in various application domains referred to as smart home, smart health, smart city, smart energy or smart mobility. What is common to these smart technologies is that they integrate sensors, actuators, connectivity and analytics [9]. What they facilitate is pre-emptive action and coordination which is grounded in evidence, history data, state information and intelligent algorithms [10]. Since business process management is exactly concerned with coordinated action, there have been attempts to generalize the commonalities of these smart application scenarios in terms of their dynamic adaptation and continuous learning towards smart business process management [11,12].

This section provides an overview of various techniques that are related to smart business process management. We also clarify how the contributions of this special issue relate to the overall spectrum of research in this area. Next, we explicate the notion of smartness in the context of information systems research. Then, we illustrate the richness of smart business process management by highlighting important contributions for each of the three levels.

3.1. Smart multiprocess management

Prior research on smart multiprocess management has mainly focused on supporting repository management. This stream of research was triggered by work on similarity [13] and automatic matching techniques between business process models [14]. These provided the foundation for various automatic refactoring techniques [15] including harmonization of terminology [16], automatic service derivation [17], semantic search [18] or operations of merging business process models [19].

¹ <https://en.oxforddictionaries.com/definition/smart>.

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