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Modeling Dynamic Aspects of Sensitive Business Processes for Knowledge Localization

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Abstract

This paper introduces BPM4KI- a generic Business Process Meta-Model for Knowledge Identification, which encompasses a clear and semantically rich definition of Sensitive Business Processes (SBPs). This meta-model is well founded on «core» domain ontologies. It covers all aspects of business process modeling and knowledge management: the functional, organizational, behavioral, informational, intentional and knowledge perspectives. The aim of BPM4KI is to develop a rich and expressive graphical representation of SBPs in order to identify and localize the crucial knowledge that is mobilized and created by these processes. In this research work, we focus more specifically on the description of the « Functional Perspective», which represents the core dimension in SBP modeling, exploring the collaboration, interaction and knowledge aspects. Besides, we evaluate the relevance of some proposed concepts through a real SBP scenario from medical domain in the context of the organization of protection of the motor disabled people of Sfax-Tunisia (ASHMS).

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Keywords: Knowledge Localization; sensitive business process; business process modeling; DOLCE; «core» domain ontologies.

1. Introduction

Sensitive Business processes (SBPs) modeling has become primary concern for any successful organization to improve the management of their individual and collective knowledge. These processes are characterized by a high number of critical activities with intensive acquisition, exchange, sharing, creation and (re)use of very specific knowledge « crucial knowledge», high complexity in their execution, weak structuring, communication-oriented actions and high degree of collaboration and interactions (intra/inter-organizational) between a wide range of agents/experts. Although it manipulates a high degree of knowledge that is crucial to the organization and its key role for organizational KM, a SBP typically lacks a description and a representation that would allow its modelers to specify it, stakeholders to perfectly valorize the mobilized knowledge, and knowledge systems to adequately support it. The specification of a precise conceptualization, together with an appropriate representation notation, that precisely describes the dynamics with which knowledge is created and manipulated during a SBP, is still an open issue.

BPM formalisms that are widely-followed in current research and practice scenarios (such as RAD [1], eEPC [2],

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UML AD [3], BPMN 2.0.2 [4], KMDL 2.2 [5, 6], DCR Graphs [7] and NKIP [8]) did not include all the required features to describe an SBP, as discussed in [9, 10]. In order to improve a SBP representation, this paper presents a conceptual specification of SBP organized in a BP independent generic meta-model common to these BPM formalisms which ensures the best suitability to model SBP, entitled «BPM4KI: Business Process Meta-Model for Knowledge Identification». BPM4KI intends to explicit and organize the key concepts and relationships that characterize an SBP. It covers all relevant aspects/dimensions relating to BPM-KM, i.e. the functional, the organizational, the behavioral, the informational, the intentional and the knowledge perspectives. BPM4KI is semantically rich and well-based on «core» domain ontologies [11] (which are based on top of the DOLCE foundational ontology [12]). These ontologies offer repositories of generic concepts and relationships semantically rich and consensual which we reused, firstly, to broaden and deepen the elements of SBP definition, and on the other hand, to characterize the useful concepts for a rigorous specification and an enriched SBP modeling. In this research work, we focus more on the description of the « Functional Perspective » which represents the central aspect of SBP modeling, exploring the interaction and knowledge aspects. This dimension (individual/collective aspect of activities, critical activities mobilizing crucial knowledge, knowledge intensive activities, communication and collaborative activities that form a basis for knowledge creation and sharing, knowledge flows between activities, etc.) is not yet fully explicited and integrated within BPs/SBP models. So, we aim at obtaining new knowledge helpful for developing BPM approaches/formalisms that could model in an adequate manner all SBP relevant aspects.

The remainder of this paper is organized as follows: section 2 presents a specification of SBP, describing its main characteristics. Section 3 presents the central concepts that describe the functional dimension of SBP modeling. Section 4 illustrates the application and the relevance of some concepts, based on a real case study. Section 5 concludes the paper and underlines some future research topics.

2. Sensitive Business Process Specification

2.1. *Main characteristics of SBP*

An SBP is a particular type of BP. It has its own characteristics that distinguish it from classical BPs [10,13]. According to Ben Hassen et al. [10,13], an SBP commonly mobilizes a high number of critical activities with very specific «crucial knowledge». It presents a diversity of knowledge sources consigning a great amount of very important heterogeneous knowledge. Moreover, an SBP mobilizes a high dynamic conversion of knowledge and a high degree of collaboration and interactions among participants. Its execution involves many external agents and experts, who carry out actions with high degree of tacit knowledge and high levels of expertise, creativity and innovation. In addition, an SBP is typically an unstructured or semi-structured BP, requires substantial flexibility, encompassing a highly dynamic complexity. Besides, its contribution to reach strategic objectives of the organization and its realization duration are very important. Due to those characteristics, SBP modeling is critical. In this context, several BPM formalisms have been proposed in BP engineering as likely to represent SBP [9,10].

2.2. Approaches and formalisms for SBP modeling

As SBP models get more complex, the selection of the appropriate modeling formalism is of prime importance. Some conventional graphical BPM formalisms, include, amongst others, EPC and BPMN 2.0, have been adapted to allow the representation of the intrinsic elements of knowledge within BPs. In addition, the literature shows a set of approaches and notations dedicated for the representation of processes with high knowledge intensity [14], originate from the knowledge modeling context, including PROMOTE, KMDL 2.2 and NKIP. Table 1 and Table 2 present a summary of the strengths and weakness of the most frequently BPM formalisms mentioned in scientific literature with respect to characteristics/issues relevant to the SBP modeling. These formalisms were mainly analyzed from the following two points of view (1) possibilities to represent data, information and knowledge, and (2) possibilities to represent process logics. Both views are important for representation of static and dynamic aspects of SBP.

Table 1and Table 2 show that none of those proposals conveniently includes or addresses all or at least most of the SBPs important characteristics [10,13]. So, this leads to ambiguity and misunderstanding of the developed SBPs models. In order to address existing limitations, we develop a BP independent generic meta-model common to these BPM formalisms which ensures the best suitability to model SBP, entitled «BPM4KI».