International Conference on Knowledge Based and Intelligent Information and Engineering Systems, KES2017, 6-8 September 2017, Marseille, France

A Conceptual Framework for Social Business Process Management

Hanane Ariouat[a,*], Chihab Hanachi[a], Eric Andonoff[a], Frederick Benaben[b]

[a]IRIT, University Toulouse 1-Capitole, 2 rue du Doyen Gabriel Marty, 31042 Toulouse Cedex, France
[b] Ecole des Mines d'Albi-Carmaux Campus Jarlard 81013 Albi Cedex 09 âĂŞ France

Abstract

Over the recent years, Business Process Management (BPM) paradigm has become more socially driven. The socialization of processes has become an unavoidable way to realize flexible processes by including means to improve collaboration, knowledge sharing and collective decisions. However, the majority of current proposed approaches are limited to the exploitation of social technologies (social networks, blogs, wiki...), without providing a coherent conceptual and reusable framework, independent from those technologies. This paper defines precisely the social dimension to be taken into account in BPM and recommends a set of models to structure the design and development of Social BPM. In addition, a social ontology has been developed with Protege 5.0 and rules for inferring knowledge and queries for exploiting it have been implemented with SWRL and SPARQL.

1. Introduction

Advanced process-based applications such as risk management, virtual organizations, and factories of the future are subject to frequent changes. Sometimes, processes involved in such applications are not completely defined at the beginning of their deployment and they require the intertwining of design and execution phases while the process evolves. In fact, these types of processes not only requires flexibility to adapt to changes but they also should include means to ease collaboration, knowledge sharing and collective decisions to make the process converge towards the actors' common goal. In addition, all these requirements should be taken into account over the process life cycle. For example, users could be involved not only at design time to make a decision about the process but also at run-time to guide its execution or to perform tasks.

If we examine traditional BPM systems and approaches, we can notice that most of them do not meet these requirements and suffer from the following limitations:

- *Deviation and lost of innovation:* end-users of processes (actors) are different from their designers and there is no communication between these two types of actors. This problem leads to a deviation between execution

* Corresponding author. Tel.: +33-561633563.
E-mail address: Hanane.Ariouat@ut-capitole.fr

and design models, and decreases innovation by a lack of communication. This problem is also referred as the model-reality divide. A design participative approach with knowledge sharing of those actors could help in solving these two problems.

- *Lack of visibility:* Most of BPM tools allocate a task to an actor according to standard access control policies (e.g. role-based access control) and the actor is isolated and has no global visibility on the process. Users are aware of *what should be done?* but ignore *what can be done?*. Providing them information about *what can be done?* could lead actors to perform the more appropriate tasks. However, we can mention the case handling approach of Adams et al. [12] to deal with the issue.
- *Lack of Cooperation:* The user has no support from the system to be assisted in his tasks in case of difficulties such as overwork or lack of individual skills, resources or information. What could be useful is means to interact with collaborators in order to ask for information, to delegate dynamically tasks to volunteers, to call for proposals, to launch decision processes for solving indeterminism in the case of choices, and so on. Interactions followed in such mechanisms could be informal or compliant with strict rules or protocols (vote, negotiation...) leading to commitments.

Regarding the state of the art, three types of works exist. The first type only couples BPM systems to social technologies without providing theoretical backgrounds or models to have reusable solutions. The benefit of this coupling is difficult to measure. The second type provides frameworks for defining social relations between homogeneous objects (actors, machines or tasks). These social relations ease the coordination between considered objects. Even if the idea is interesting and improves the efficiency of the organizational aspect, no conceptual model is provided and the relations between different objects remain static; they do not integrate interaction protocols (vote, negotiation, call for proposal...) as it could be the case in real life. The last type of work focuses on the allocation task procedure and tries to improve it by providing deontic modalities (such as obligation, permission or prohibition). This mechanism empowers the actors, structure their relations and rules their coordination. However, a limited attention has been given to formal models while existing formalisms such as deontic petri nets could be used to provide solid backgrounds to this solution. In conclusion, existing works do not provide a comprehensive framework to address the integration of BPM and social dimension coherently. Moreover, they do not cover the process life cycle and only few of them provide reusable models.

Giving all these observations, the aim of this work is to propose a new approach integrating suitably social concepts into BPM to provide efficient Social BPM systems. This approach includes a conceptual framework to support modeling, development and execution of such systems. This model is organized around reusable and conceptual basic bricks corresponding to protocols, social relations and constraints. The originality and the advantages of our proposal are i) the definition of a social meta-model suitable for the field of the Social BPM and independent of any social technologies ii) the possibility of re-using components of the model iii) possible rule-based-reasoning on this meta-model represented by an OWL ontology iv) innovation, visibility and cooperation improvement.

To illustrate the different aspects of our work, we consider crisis and disaster management situations where formal plans/processes can be followed and where the social dimension is of a paramount importance. Indeed, crisis and disaster management involves several stakeholders, each one having its own knowledge and procedures and internal organization, but all together should take part of a collaborative process in order to achieve their common goal: the crisis resolution. Some of the stakeholders could be official partners, while others could be NGOs that dynamically integrate the group. Also citizens can become a first class partner through socio-media by providing useful information and services.

The remainder of this paper is organized as follows. Section 2 provides our social meta-model. Section 3 presents the ontology corresponding to this meta-model. Section 4 describes related works. Finally, we discuss our approach and conclude the paper.

2. Social BPM Meta-model

In order to engineer social business processes, we need a conceptual model of them. This conceptual model represents the main concepts useful for handling processes namely the behavioral, the organizational and the social perspectives of the processes as well as their links (cf. Fig. 1).