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Adapting selection strategies of executors of business processes based on profit and social qualities☆

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ABSTRACT

This paper discusses an approach for selecting executors of business processes based on profit and social-quality criteria. The approach relies on a trusted authority to ensure the transparency and fairness of the selection. Executors are known as slaves and exhibit certain social qualities (e.g., selfishness and goodwill) in response to the requests of owners of business processes known as masters. A set of simulation tests are carried out to demonstrate the feasibility of the approach in term of what selection strategy is best, i.e., profit-based, social quality-based, or both.

1. Introduction

In a previous work, we discuss how to capture and quantify social qualities of business processes' components namely task (t), person (p), and machine (m) [16]. On the one hand, a Business Process (BP) consists of tasks connected together according to a specific business-process model and assigned to persons and/or machines for execution. On the other hand, a social quality like selfishness and goodwill reflects the "behavior" that persons and/or (owners of) machines exhibit in response to certain decisions they made like declining to execute a task despite the positive profit. In this paper, we examine the impact of both profit and social quality on adapting the strategies for selecting executors of BPs.

Our long-term research project that blends social computing with BPs (*aka* BP *socialization* [4,9,15]) has permitted to identify social relations between tasks (t2t), between persons (p2p), and between machines (m2m), and to use these relations to develop a configuration network of tasks, a support network of machines, and a social network of persons. Although we acknowledge, on different occasions, that tasks and machines as well cannot "socialize" (in the strict sense) like persons do, putting tasks together and machines together has similarities with how persons behave daily and may even translate into a certain underlying social behavior/strategy for the BP's owner (i.e., person).

In this paper, the interactions between persons/machines and BPs are driven by two criteria: resource availability to ensure BP execution and profit/loss to make/incur from BP execution. The first criterion allows to consider resources that are limited, non-renewable, and/or non-shareable. The second criterion allows to decide when either to accept executing a BP

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amidst negative profit or to reject executing a BP amidst positive profit. Due to the sensitivity of some details (e.g., profit ranges for rejecting/accepting BPs and cost ranges for assigning BPs to persons/machines) and to avoid any biases during negotiation due to the nature of some social qualities (e.g., selfishness is a negative quality if not justified with valid reasons), we develop a trusted-authority based approach for supporting the analysis of the strategies for selecting BPs' executors. The authority receives details from persons/machines (referred to as slaves in this paper) and BPs (referred to as masters in this paper, too) and ensures that persons/machines comply with their acceptance/refusal strategies and BPs comply with their selection strategies. Non-compliance leads to penalties like exclusion from the pool of potential executors, for example.

The rest of this paper is organized as follows. Section 2 presents some related work, summarizes our previous work on social design and social coordination of BPs, and discusses the criteria that drive the profit-based selection of executors. Section 2.3 introduces the foundations of our approach as well as the social qualities in term of materialization and quantification. A set of experiments are reported in Section 4. The benefits of our approach are discussed in Section 5. Finally, Section 6 concludes the paper.

2. Background

This section presents some related work and then, an overview of first, our work on BP social-design and social-coordination ([12] and [13]) and second, selection of executors of BPs based on profit.

2.1. Some related work

Our research is at the cross-road of two disciplines namely blending social computing with BPs and assigning social qualities to software components.

Blending social computing with BPs results into the development of social BPs. This blend sheds the light on the informal networks that perfectly co-exist with formal networks in an enterprise [8] as well as demystifies who does what, profiles customers, and even re-engineers processes [1,6]. Moreover, many enterprises recognize the need of rethinking their strategies and reevaluating their operation modes; the world is getting more "social" [5]. Rito Silva et al. describe the AGILIPO project that embeds social features into business process tools [17]. The AGILIPO modeling and execution environment includes three roles known as executor, modeler, and developer that stakeholders take over. In another work, Brambilla et al. propose a specific notation for designing social BPs [3]. Social networking helps organizations harness the value of information relations and weak ties without compromising the consolidated business practices that are found in conventional business process management solutions. Last but not least, Koschmider et al. demonstrate how social networks help enhance trust between users [10]. Two networks are built upon a set of BPs and recommendations. The first network provides an organizational view of BPs and the second network shows the relations among modelers who use the recommendation system to build the business-process model.

Assigning social qualities to software components such as Web services is discussed in [18]. Yahyaoui et al. present a framework for managing Web services using both the concept of community and the metaphor of social networking. The mining of networks of Web services results into assigning social qualities to Web services like selfishness, fairness, and trustworthiness. Building upon the work of Yahyaoui et al., Maamar et al. also assign social qualities to communities of Web services [14]. To this end, they identify possible social relations between communities, build social networks of communities using these relations, and finally mine these networks.

Several existing works [1,3,5,6,8,10,17] already promote the benefits of blending social computing with BPs and introducing social relations between BP components (i.e., p, m, and t). In this work, our objective is to go beyond the simple assignment of social qualities to executors/owners. In fact, we capture and quantify the social qualities along with analyzing them so that BPs (their owners) adapt their selection and collaboration strategies. Thus, the current work is not restricted to proposing an adaptation approach but rather builds the pillars for new adaptable approaches for selecting potential executors of BPs.

2.2. Business process social-analysis in brief

BP social-design sheds the light on the three components of a process (i.e., t, p, and m) as well as the (execution and social) relations that connect these components together [9]. A task is a work unit that constitutes with other tasks a BP and that a person and/or machine execute. Fig. 1 illustrates a simple BP along with some components like t_1: scan patient details, m_2: Patient IS, and p_j: cashier. Task execution calls for resources that could be restricted as per our work on BP social-coordination. In addition to the execution relation that binds persons/machines to tasks, we define social relations between tasks, between persons, and between machines. The following are some examples of social relations:

1. `Interchange`: t_i and t_j engage in an interchange relation when both produce similar output with respect to similar input received for processing and the requirements of these tasks do not overlap (e.g., t_1: scan patient details and $t_{1'}$: enter patient details manually).
2. `Backup`: m_i (e.g., scanner in the main reception) and m_j (e.g., three-function printer in the nurse station) engage in a backup relation when both have similar (or overlapping) capacities.