

## Exploring the influence of Social software on Business Process Management

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**Abstract:** Social software (SS) is all around us now. It has received much attention in the academia and industry due to many success stories. When the social software movement emerged, along with it came a new way of building context. Sure, there were plenty of services built to connect people in new ways around topics, social BPM (SBPM) is one example. SBPM fuses business process management (BPM) practices with social networking applications and SS principles. Enhancing the enterprise performance and process's improvement was behind this fusion. Yet, the benefits of SS were less integrated into the BPM and some of them continue to be largely excluded. So the first aim of this paper is to tighten and give an overview about SBPM roots and principles from one side. And from the other side, to investigate the principles of SS which proved that the success of SS is based on four important principles identified in research. The second aim of this paper is to analyze and make a comparative study of current SBPM approaches according to our classification criteria in order to identify the gaps. Then we will suggest ideas on how to improve the integration of social software and BPM.

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**Keywords:** Social software, BPM, Social BPM, process improvement

### 1. INTRODUCTION

Priority of every organization or company is to increase operational efficiency, reduce costs, improve quality of their products or services and better manage operational knowledge. Many organizations are using business process management (BPM) as a key component in automating their processes, increasing standardization and improving performance. BPM typically consists of a series of activities for the ongoing improvement of business processes that are carried out within an iterative life cycle (Weske, 2012). The technical tool to manage business processes is Business Process Management System (BPMS). Currently, BPMS support the entire BPM lifecycle, from identifying processes to analysing, redesigning, implementing and monitoring these processes. Besides, business processes are classified into two categories depending on their nature: the first concerns well structured, highly repetitive processes subject to little change over time and often they are supported by traditional BPM. The second category concerns loosely structured processes known as knowledge-intensive processes which cannot be supported by traditional BPM (Gottanka et al., 2012). Moreover, as it was affirmed by (Gilbert, 2010) in an example of a large bank, more of 60% of the processes are knowledge-intensive processes known also as ad-hoc processes, not covered by classical BPM methods while just 2.5% of them are highly complex repetitive and allow a substantial automation. Conversely to well-defined business processes, ad-hoc processes emerge spontaneously, have a short lifespan and are executed only a few times as it was affirmed by (Huth, 2004). Such ad-hoc processes can be seen as to what (Bruno et al. 2010) called the accelerated “pace of

changes” as well as the “spreading of context information and the demand for quickly created process solutions” of BPM. Research in the field of BPM pays more attention to reduce its incapacity in order to support ad-hoc processes.

Owing to the frequently stated fast changing business world and unpredictability of processes, several works in academia and industry propose concepts to enable the continuous and rapid adaptation of processes to change. This capability is known as agility, thus BPM must be agile in order to be able to react quickly and adequately to internal and external events. Further information about enterprise agility and organizational agility could be found in (Triaa et al., 2016). One of the recent solutions to support BPM agility is the integration of Social Software (SS) principles and techniques within BPM leading to the emergence of Social BPM (SBPM).

Social software which implements the concept of Social Web is spreading quickly in society, organizations and economics (Schmidt, 2008). Social media applications focus on enabling communication, cooperation, and collaboration of individuals and groups over the Internet. The interaction of non-predetermined individuals and the creation of artifacts supporting social production principle are supported by social software. Social production principle supports the combination of input from independent contributors which are not organized in a hierarchy. Moreover, social software supports trust and reputation among contributors instead of authority granted by top management. Due to egalitarian principle, everybody can initiate and make changes which are not restricted to hierarchical structure. Thus, the open contributions of different users lead to make decisions

collaboratively by combining their inputs. Several researches (Argote 1999, Gran 1996, Wernerfelt 1984) affirmed that organizations that can make full use of their collective expertise and knowledge are likely to be more innovative, efficient and effective in the market place. Furthermore, the success of social software is not just based on social production and egalitarian approach but rather on other two important principles: weak ties theory of Granovetter and service dominant logic approach of Vargo and Lusch.

In literature, combination of BPM and social software is discussed under the terms subject-oriented BPM (Fleischmann, 2010), social BPM (Nurcan and Schmidt, 2009) and BPM 2.0 (Roychowdhury and Dasgupta, n.d.; vom Brocke et al., 2011). These terms refer to the improvement of business processes that seeks to break down silos by encouraging a more collaborative and transparent approach. In our paper we use the term Social BPM to describe the integration of social software within BPM. In such context, BPM paradigm changes from closed to open and social. Rather than centrally defining processes by the managers and deploying them for execution by internal performers, business processes can be reached to a broader class of stakeholders. Thereby, actors can interact with each other, to be informed, share experience and express their opinion freely. A social software can enhance business processes by improving the exchange of knowledge and information, and by speeding up the decision making process. The integration of social software with BPM depends on the companies' needs. Some of them will only use social software functionalities for communication, others will use it to reduce their time to market, and yet others will use it for transformation. Actually, in such continuously changing and turbulent work environment, using social software principles to enhance process adaptation and transformation seems to be strongly important.

While most previous research was focused on improving the collaboration between the model creators and model users during process design phase, minor loosely coupled social features within BPMS are suggested. This is far from enabling full exploitation of the social BPM benefits and the principles of social software which have been identified a long time ago but not properly implemented. Besides the importance researches work made from several years, the current status of social BPM research is still in its infancy. The benefits of social software were less integrated into the BPM and some of them continue to be largely excluded.

In this paper, we present a comparative study between the most referenced social BPM approaches and we identify the gaps for a better integration of social software within BPM. So the remainder of this paper is structured as follows. Section 2 gives a depth review of BPM and the main existing issues the roots of SBPM's emergence classified according to our selective criteria. Section 3 provides an overview of the social software and its main principles. SBPM approaches are studied and analysed with regard to our defined classification criteria in section 4. This leads to identify gaps in SBPM and what is lacking. Then Section 5 presents the suggested approach for effective and efficient SBPM improvement

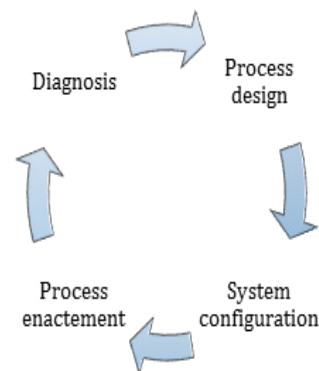
which presents our future work. And finally, section 6 concludes the paper.

## 2. BUSINESS NEEDS

### 2.1 BPM definition

BPM is a management approach aimed at describing and managing the business processes in an organization. The goal of BPM is to achieve the organization's objectives by aligning the business processes with these objectives and to continually improve these processes. It includes concepts, methods, and techniques to support the design, administration, configuration, enactment and analysis of business processes (Weske, 2007). BPM provides a platform to manage business processes through their lifecycle as it is depicted in Fig. 1 which represents one of the simplest proposed models of BPM's lifecycle in the literature. Actually, organizations use BPM techniques and tools for the design, enactment, control as well as the analysis of operational business processes in order to sustain their competitive advantage and to improve the effectiveness and efficiency of their value creation (van der Aalst, 2003), (R. Y. Hung, 2006).

Fig. 1: Van der Aalst's BPM model



The need to support quick adjustment of business processes in order to meet changing environmental conditions was behind the development of several approaches and suggestions in the literature. One of these suggestions is SBPM.

### 2.2 Evaluation criteria

The motivation for including social software and BPM contains many facets: fostering collaboration, sharing knowledge, support process models adaptation and others. The current state of traditional BPM has two principal issues which are identified by (Erol et al., 2010): “model reality divide” and “lost innovations”.

- *Model reality divide*: it represents the gap between what the process actually is and what happens in real life. In fact, during the design stage of BPM lifecycle, process models are created using modeling languages like BPMN, Petri-nets and others. Since these process models

are often an abstraction from the real world, exceptions are often not covered by them as well as tasks that are difficult to be modeled. Moreover, regarding the continuous change of work environment it is not an easy task to predict all the situations. These process models which are modeled by model creators are not fully accepted and followed by the model users which are employees.

- *Innovation's loss*: during business process lifecycle, the lack of model users' implication leads to lose some important ideas and information for innovation. Working under a strict top down manner, employees are not motivated to share ideas for process improvement and innovation. Besides, their knowledge is either lost entirely, or applied on the local scale of individual process instances. Successful innovation depends on collaboration and openness to outsiders and new ideas which is not supported by traditional BPM. Its top down approach leads to high transactions costs and time between process stakeholders, and thus important and valuable information is lost and potential improvements remain unrealized.

We are wondering how researchers tried to avoid the divide between abstract process models and the executed processes and how to capture relevant and important information for innovation. So to clarify the key evaluation questions and the purpose of the evaluation we decompose the two principal issues into more specific issues. In summary, the current state of BPM and its limitations identified by (Erol et al., 2010) originate from other as we called specific issues as it is illustrated in table 1. In order to make the comparative study of the referenced approaches in this paper and identify gaps, we associate to each issue some key concepts identified in (Triaa et al., 2016) defined to support organizational agility of business processes.

We start by identifying related concepts to the model reality divide issue of BPM. As it is illustrated in Table 1, this issue originates from the lack of collaboration and communication between the model creator and the model users of the executed processes. Communication and collaboration are the core enablers of organizational agility as it was depicted in (Triaa et al., 2016). These practices will enable knowledge production and knowledge sharing in a timely manner. Moreover, employees who are forced to do task and they are not really implicated in the enactment of their processes become less motivated. The lack of employees' motivation leads to a resistance to perform process oriented activities. Adding to that, although the importance of resources/skills which are important assets in successful process's implementation, they are not managed by current BPM. Indeed, they have to be aligned with business needs by transitioning easily and rapidly from one resources/skills allocation to another in order to ensure process robustness. Since current BPM is a process oriented approach, its technical tool does not feature the means to self-adaptive resources/skills allocation during process execution. Supporting scalable resources/skills allocation means the ability of a system to detect and recover from potential

problems and continue to function smoothly. Adding to the organizational change, process context changes over time. Thus, processes require continuous adaptation to the given context. But, current BPMS do not account for a broader variety of business contexts of their processes. They are focused mainly on clear structured processes that require improvement, standardization, or automation. Thereby, the implemented process differs more and more from the best practices and model users tend to execute their own private process.

Then we move to identify the related concepts to the lost innovation issue of BPM. The loss of innovation especially originates from the organizational exclusion and the insufficient feedback mechanisms. Model users cannot submit their ideas easily owing to the top down approach and hierarchical controls of traditional BPM. Accessible information is an important concept of organizational agility as it depicted in (Triaa et al., 2016). Thus, model users need to have the means to suggest their ideas and to receive feedback whether their idea has been realized or unrealized. Otherwise, the lack of information dissemination and lack of collective empowerment lead to have stable and secure situations of work. In such situation, employees rely on their existing knowledge and acquired interpretations. Furthermore, centralized decision making are considered as too inaccurate and too weak to absorb successfully and marketable the required complexity of the organizational challenges. They lead to delay resources adaptation. In fact, the principal defect of centralized organizational structures is their tendency to reduce managerial expertise on the shoulder of a small and uplifted group of people. So BPM need to support organizational integration during its lifecycle to avoid the innovations loss issue.

So now after defining the evaluation criteria for this comparative study, in the rest of the paper, we start by giving theoretical background about social software and its main principles, followed by the definition of SBPM and the description of the reviewed SBPM approaches. Then we evaluate these approaches according to our classification criteria in order to identify gaps and what is lacked.

### 3. SOCIAL SOFTWARE

#### 3.1 Background

Social media applications focus on enabling four primary functions: communication allowing users to converse with each other, cooperation enabling users to share content with each other, collaboration encouraging users to work with each other and finally connection leading to create networks and aggregation of information, instead of focusing on productivity and process support (Buruah, 2012). Moreover, social software is closely linked to Web 2.0.

Principal BPM Issues	Specific issues of BPM
<b>Model reality divide</b>	Lack of communication among stakeholders
	Resistance from stakeholders to perform process oriented activities: lack of motivation and authority
	Lack of scalable resources/skills configuration
	Lack of first time right chosen of most performing skills
	Lack of contextual adaptation of process: inability to manage changes
<b>Innovation loss</b>	Lack of well-defined feedback mechanisms to support accessibility of customized information
	Inability of collaboration owing to structural hierarchy
	Organizational exclusion

**Table 1. BPM issues specification**

Actually, Web 2.0 has the potential to deliver rich peer-to-peer interactions among users, enable collaborative value creation across business partners and create dynamic new services and business models. As it was affirmed by (Hippner and Wilde, 2005), the main characteristics of social software are: (1) focus on individuals and communities, (2) self-organization of users' participations, (3) voluntary contributions, (4) double role played by actors: information provider and information consumer, and finally (5) aggregation and fusion of information (instead of the information of individuals). Thereby the use of SS may lead to either create artifact or to fusion and aggregate existing artifacts. Two kinds of artifacts could be created by social software: content and context. Content may be of different types such as text or multi-media while context can be further differentiated into three sub-types: Annotation, reputation and social links (Schmidt, Nurcan, 2009). Annotation is information that helps to understand, find, and evaluate artifacts. Reputation is a substitute for trust in social software (in a virtual community users do not know each other so it is necessary to provide reputation information). Social links provide information about connection between human beings.

### 3.2 Main principles

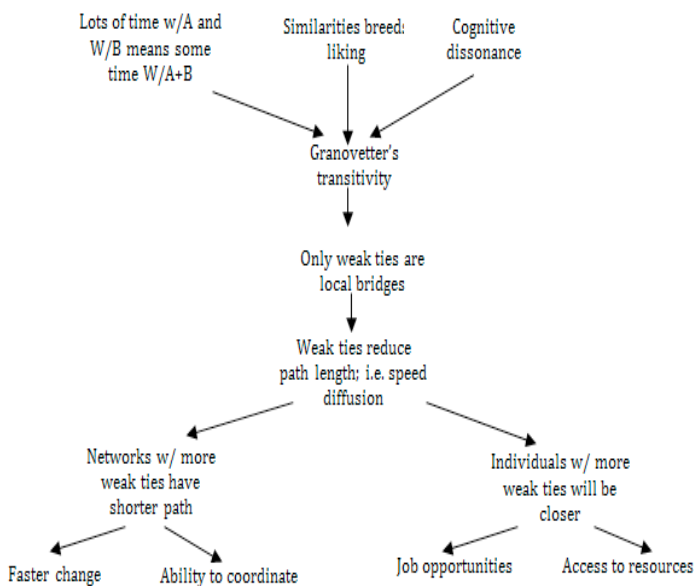
The success of social software is based on four principles (Schmidt, Nurcan, 2009): Weak ties, Egalitarianism, Social production and Service dominant logic.

#### 3.2.1 Weak ties

One of the most important principles of social software is the weak tie theory of (Granovetter, 1983).

An American sociologist recognized that weak ties, defined as remote and tenuous relationships, enable reaching populations and audiences that are not accessible via strong tie, as being defined as close relationships with well known persons. Granovetter defined the strength of a tie as a combination of services, the amount of time, the intimacy, and the emotional intensity between persons. His work leads to give an explanation of issues as: how information flows through a social network, how different nodes can play structurally distinct roles in such process, and how these structural considerations shape the evolution of the network itself over time. Granovetter argued that interpersonal ties connect different parts of a social network, and weaker ones act as bridges between groups that might not otherwise interact. When these different groups, with their distinct internal sets of knowledge and skills, connect via acquaintances, those ideas and skills are shared. Granovetter affirmed that the stronger tie connecting two individuals, the more similar they are in various ways. If strong ties connect A to B and A to C, both C and B being similar to A and by transitivity B and C are probably similar to one another. Furthermore, the theory of cognitive balances as formulated by (Heider 1958) and especially (Newcomb 1961) also predicts this result. While strong ties provide us security and trust, weak ties can provide us possible new information, new acquaintances and access to new resource. As depicted in Fig. 2, Granovetter's transitivity lays on three main factors: Spatio-temporal co-occurrence, Similarity and the avoidance of cognitive dissonance. Thereby, he revealed that weak ties have the ability to function as a bridge between two groups as it was depicted above. Weak ties are more likely to be sources of novel information and reduce path length leading to find job quickly, to access resources, to make a rapid coordination and accelerate change.

Fig. 2. Overview of Granovetter theory



### 3.2.2 Egalitarianism

The second important principle of social software is egalitarianism which is realized by merging the roles of contributors and consumers and introducing a culture of trust instead of formal access procedures. Egalitarianism is the assignment of equal rights to all members of a society and tightly connected to democratic principles. In social software, the role of trust is increased within organizations and the idea is that all the contributors have the same rights to contribute; this will encourage and maximize participation and should result in achieving the best solution (Bruno et al., 2010). Thus, it supports the idea, which (Surowiecki, 2005) collected under the title "wisdom of the crowds". Empirical data shows, that for many decision and planning problems combining as many inputs as possible delivers statically better results than relying on experts, which creates the insolvable problem of expert selection.

### 3.2.3 Social production

Another important principle of social software and could be considered as the consequence of egalitarianism approach is social production. This concept is defined as the creation of artifacts by combining the inputs from independent contributors without predetermining the way to do this. It is an alternative organization of production introduced by several authors such (Benkler 2006, Topscott 2011). They affirmed that the free flow of information and knowledge as a precondition for a sustainable development of economy and single cohesive enterprise. Thus, new ideas come from the outside and are based on openness culture leading to cooperate with many different people and to combine the best thoughts and create competitive product. Social software supports this principle by enabling users to organize information and knowledge. Thereby, no predefined taxonomies or hierarchical structures are used. Moreover, the

created artifacts could be assessed in a timely manner and a rotating improvement cycle could be initiated. Important results of social production and the wisdom of crowd are Wikipedia and Linux operating system. Furthermore, social production is based on a posteriori approach for assuring the quality of production. The collective evaluation by all participants aims to reach and to keep a high degree of quality. An important precondition for such a collective evaluation is the independence of the participants and the close level of expertise of contributors.

### 3.2.4 Service dominant logic

The last principle of social software is the service dominant logic where a service is defined as an application of specialized competences (knowledge and skills) for the benefit of another entity rather than the production of units of outputs (Lush et al., 2008). Given the marked success of this approach in marketing, it says that the traditional, goods oriented, approach for marketing has to be replaced by a service oriented (Vargo, Lush, 2007). Hence, service dominant logic postulates that the consumer does not want a product but the service rendered by the product. Thereby, there is a mutual rendering of services and not a unidirectional one since it is necessary to interact with the consumer to render the service. Thus, a transition to service dominant logic implies much more than an increased emphasis on the manufacturing firm's product-service systems: it implies a reframing of the purpose of the firm and its collaborative role in value co-creation. What they emphasized was how a supplier's knowledge resources and core competencies are fundamental to firms' value propositions, which are the basis for business interactions in networks of relationships. For practitioners, this has implications for the organization required to offer customized PSS (product service system) solutions. (Vargo & Lusch, 2008a, 2008b) make a distinction between the terms "service" – the singular form and "services" – the plural form. In this new marketing perspective, the S-D Logic, they utilize the term "service" to reflect the "process of using one's resources for the benefit of another entity" (Vargo & Lusch 2004b, 2006; Lusch et al. 2007). The "goods and services" are combined under the term "service provision" with the proposition that goods are the distribution mechanism for the service provision (Vargo and Lusch 2004, 2006). Thus, the S-D logic orientation goes further, treating any knowledge-laden interactions between buyer and supplier as a service. In accordance with S-D logic, knowledge is regarded as the fundamental source of competitive advantage (Ballantyne and Varey, 2006; Vargo and Lusch, 2004), and the acquisition of specialized skills and knowledge is often a prerequisite for the ability to offer new types of services and PSS.

So now after giving theoretical background about social software principles, in the next section we will reveal how SS is integrated in BPM.

## 4. SOCIAL BPM: STATE OF THE ART

### 4.1 Social BPM definition

The identified issues can potentially be solved by SBPM. Several definitions have been proposed to understand what SBPM is and how it operates. Indeed, (Nurcan, 2005) defines SBPM as a methodology for bringing more and diverse voices into process improvement activities. While (ComputerWorldUK, 2012) suggested that SBPM is an emerging concept that marries the flexibility and pervasiveness of social media with the management discipline of BPM. Another suggestion was made by (Sinur, 2010), who considered SBPM as a concept that describes collaboratively designed and iterated processes. Indeed, the use of social software tools and techniques to eliminate the barrier between BPM decision makers and the users affected by their decisions and to improve business processes are the fundamental roots of SBPM's emergence as it was affirmed by all researchers (Schmidt 2012), (Qu, 2013) and (Raginha, 2014). Otherwise, within BPM, social software can be used to support the different lifecycle steps of a business process or to support an individual lifecycle phase. In the literature, various works were carried out to well integrate BPM and social software and to answer the research question of how to overcome model-reality divide and lost innovation principal issues of BPM.

In this section, a selection of literature works on SBPM is performed. The purpose is to identify the gaps between the current approaches and the needs that have not been taken into consideration to better integrate social software within BPM. In the following sub-section, actual works are briefly described. This list is refined in the next section using our table of BPM issues specification for analyses.

### 4.2 Integration of social software and BPM: literature review

Research in SBPM formally started in 2008 (Nurcan & Schmidt, 2009) and it has evolved ever since. The combination of concepts from BPM and social software depends on the lifecycle step of business processes. Social features not only play an integral role in the design of the processes, but also during the execution. In the following sections, we review the propositions made to support both business process design and business processes execution.

#### 4.2.1 Design phase

The first category in SBPM is to support collaborative modeling of business process. Technical and nontechnical people need to participate in the discovery, modeling and design of business processes in order to ensure process models' acceptance. The main referenced approaches supporting "social design" of business processes are presented in this section.

So, the first framework which is called BPM4PEOPLE was developed by (Brambilla et al., 2012). A social extension of BPMN known as BPMN 2.0 based on the use of design

patterns is the principal feature of this framework. The extension made by (Brambilla et al., 2012) aims to support collaboration among stakeholders and to reduce model reality divide issue using means of communication that will enable employees to exchange, talk about, integrate and leverage existing knowledge from different sources. The main used social design patterns in his framework are polls, social publication, social feedback, knowledge sharing, social sourcing, dynamic enrolment, voting and ranking/commenting and people search. These social activities are supported by the concept of community pool which is defined as the pool devoted to social activities which may represent a public social network or an enterprise social network (Brambilla et al., 2012). Adding to this framework several approaches have been proposed to better integrate social software techniques and tools within BPM practices during the design of business processes. Another proposition was developed by (Hauder, 2014) proposed a solution based upon Hybrid wiki that empowers users to collaboratively design and adapt information structures. Basically wiki pages are extended with structured information elements; types and attributes; that can be interlinked with each other in order to create complex data models in a bottom-up approach with participation of several users. The primary goal of hybrid wiki is to lower the barriers for non-experts, so that no special syntax or modeling concepts are required to utilize the structured information elements. Furthermore, (Dollmann, 2011) presented a tool called CoMoMod for collaborative process modeling. His approach mainly supports the definition and modeling of business processes. The tool supports several aspects of collaborative process modeling, such as simultaneous work of spatially distributed modelers on one process model diagram. The usage of an integrated chat messaging service supports communication during the process of collaboratively modeling business processes. The tool is limited to petri nets and event driven process chains. Moreover, (Koschmider et al., 2010) claimed that business process modeling tools are mostly 'one-person tools' which are not supposed to support model reuse and collaboration between different users. They suggest a system that supports process builders with social features. Monitoring and controlling of the collaborative business processes is achieved by applying collaboration patterns expressed by role models. Another proposition was made by (De Moor, 2009) who described various collaboration patterns. His work is based on goal pattern, communication pattern and task pattern in order to enhance communication and collaboration interaction inside the community to fulfill a specific task. An alternative solution for BPM is presented in (Qu et al., 2008) approach. Indeed, instead of having some experts as process creators, a Web-based application is provided to all experts to collaborate on the standardization and the optimization of processes. In particular, a process of collaborative wiki, called Cyano, is developed. It is used to publish hundreds of processes and it is used by thousands of experts. Beside to be content consumers, this wiki allows users to become content creators.

#### 4.2.2 Execution phase

Socially support business process during their execution phase is seldom taken into account. Thus, there are few approaches to this topic at present. One of these propositions is a framework called AGILIPO which was developed by (Silva et al., 2010). AGILIPO follows the principles of agile software development (Beck et al., 2001) and of organizational design and engineering (Magalhaes & Rito-Silva, 2009). This research primarily focuses on the human-intensive aspects of business processes, where human participation is required for activities operation. AGILIPO supports unplanned exceptions during process execution where the users are able to design on a case by case status. Thus, the processes do not need to be fully designed; they can be incomplete which is where the human-centric elements play a vital role. An incomplete process definition is specified by a set of activities that describe part, but not all, of the process instances behavior (Silva et al., 2010). AGILIPO is supported by collaborative modeling and execution tools that embed social software-like functionalities. The distinctive feature of AGILIPO tools is the integration of modeling with execution activities blurring the differences between definition and operation of business processes (Silva et al., 2010). Modelers analyze the set of generic activity instances with its associated folksonomy, and generalize the exceptions over the existing business process model, synthesizing a new version of the model. Another proposition to improve the SBPM functionalities is developed by (Vanderhaeghen, 2013). This approach enables stakeholders to communicate with each other, to create groups for discussions or to ask question to the audience of a specific business process. The given answers are not restricted to one person rather they are visible to all members of the created group. It is a sophisticated model of a process management platform that applies tagging leading to tag problems and the corresponding solutions in order to allow fast problem solutions. Another proposition that support this concept was developed by (Raginha, 2014). His approach discusses how social tagging can be used in the context of social business process management to assist and support the execution of business processes in a social environment. Indeed, the utilization of process knowledge for future execution is an effective way of improving the efficiency of business processes. So the aim of this approach is to benefit from the knowledge captured in previous executions.

## 5. DISCUSSION ON INTEGRATION OF SS IN BPM

### 5.1 Synthesis

The evaluation of the reviewed SBPM approaches is performed at three level: 1) the solved problem, 2) the applicability supported phase of BPM's lifecycle and 3) the implemented SS principles. Following the comparative study, we concluded that the presented SBPM approaches take into account only some criteria and often implemented in the design phase of the business process life cycle as it can be observed in Table 2. Indeed, most of the proposed works suggested ideas to support collaboration and communication among model creators and model users during design time and seldom to support execution of processes in order to

ensure their robustness. Yet, ad-hoc generally signifies a solution for a specific problem or issue, non-generalizable and not intended to be able to be adapted to other purposes. In many situations, a knowledge worker has to improvise or to find the suited skills to get the work done. Some researchers thought to allow discussion during process design and execution to improve collaboration (Raginha 2014, Wohed 2010). In their work, the central theme is the voluntary contribution of actors either to identify required skills or identify tasks to fulfil emergent goal. There are situations, where changes on an existing process model are necessary, when external context of the process is changing, finding ways to encourage users to participate and contribute voluntary is not an easy task.

Besides, the egalitarian participation of users in the design and improvement of processes, which leads to reduce the model reality divide issue and to ensure a higher acceptance of process models, is one of the main aims of the proposed approaches. Otherwise, this leads to have a set of process models which could be seen as just a special case of a knowledge worker process and couldn't be a common shared process between its actors. Thereby, the unrestricted contributions of heterogeneous set of actors, i.e. egalitarianism approach, within social BPM to achieve a huge amount of knowledge and information is not quite simple as the case with social applications (Facebook, twitter, Tumblr, Google Plus...). Otherwise, its successful realization requires addressing a number of different challenges. Moreover, entailing transparency and open modifications of freely contributions in such dynamic and ever-changing work environment and without restricted regulations may lead to divert the executions of business processes from their specifications. Such deviation could be not communicated and cannot be used by experts to evolve business process definition. This is an example of an issue poorly resolved and requires some top-down editorial control, by increasing the precision of operational decisions within processes in order to have a better assessment of risk.

Actually, social BPM is based on the idea that the collective wisdom of a crowd can create better process solutions than individual experts alone. Indeed, it was affirmed by several researchers that groups are smarter than individuals due to the "Creative Plus", which no one mind could achieve by itself (Overstreet, 1925, Watson, 1928). But, crowds, of course, are not always wiser than individuals since the degree to which crowds are more accurate than individuals is a function of two factors: expertise and diversity as it was outlined by (Larrick, 1999). Thus, a crowd could be wiser than individuals if it consists on individuals with some knowledge or expertise about the issue in question. Thereby, applying the wisdom of crowd's theory within BPM in order to support its lifecycle needs a further control to create contextualized communities and subsequently to have an exploitation of the social BPM benefits which is not supported by actual approaches at present.

Otherwise, actual social BPM enable team communication and problem solving through task sharing, email integration,

Principal Issues of BPM	Specific issues of BPM	Proposed SBPM Approaches	Applicability Supported Phase		Implemented SS Principle	
			Design	Execution		
Model reality divide	Lack of communication and collaboration among stakeholders	[Brambilla, 2012]	X		<i>Social Production Egalitarianism</i>	
		[Hauder, 2014]	X		<i>Social Production Egalitarianism</i>	
		[Dollmann, 2011]	X		<i>Social Production Egalitarianism</i>	
		[Koschmider et al., 2010]	X		<i>Social Production Egalitarianism</i>	
		[De Moor, 2009]	X		<i>Social Production Egalitarianism</i>	
		[Qu et al., 2008]	X		<i>Social Production Egalitarianism</i>	
		[Silva et al., 2010]		X	<i>Social Production Egalitarianism</i>	
		[Vanderhaeghen, 2013]		X	<i>Egalitarianism SD logic</i>	
	Lack of motivation and authority					
	Lack of scalable resources/skills configuration					
	Lack of first time right chosen of most performing skills					
	Lack of contextual adaptation of process: inability to manage changes	[Silva et al. 2010]			X	<i>Social production</i>
		[Raginha, 2014]			X	<i>Social Production</i>
[Wohed, 2010]				X	<i>Social Production</i>	
Innovation loss	Lack of well-defined feedback mechanisms to support accessibility of customized information					
	Inability of collaboration owing to structural hierarchy	[Brambilla, 2012]	X		<i>Social Production Egalitarianism</i>	
		[Hauder, 2014]	X		<i>Social Production Egalitarianism</i>	
		[Dollmann, 2011]	X		<i>Social Production Egalitarianism</i>	
		[Koschmider et al., 2010]	X		<i>Social Production Egalitarianism</i>	
		[De Moor, 2009]	X		<i>Social Production Egalitarianism</i>	
		[Qu et al., 2008]	X		<i>Social Production Egalitarianism</i>	
		[Silva et al., 2010]		X	<i>Social Production Egalitarianism</i>	
		[Vanderhaeghen, 2013]		X	<i>Egalitarianism SD logic</i>	
	Organizational exclusion					

Table 2. Literature classification

instant messaging. However, they do not support pull and push service of customized information distribution during run time. The information used as a basis for decision-making is threatened of becoming outdated and distorted.

The key requirement for the success of process management is that the information is and stays valid. Thereby, the accession of the required customized information in real time is a crucial concept for a robust execution of business processes. Moreover, information is not classified, structured



and organized; each actor can express his or her opinion freely and give further suggestions that need analysis before select the most relevant ones. The unrestricted contributions are supported by BPMN2.0 functionalities. An integration of social design pattern to BPMN, in order to reduce model reality divide and ensure an acceptance of process models, is quite similar to some actual social network applications. Yet, social relations inner organizations cannot be dissociated of organizational relations and information context. That is to say and as it was outlined above, a lack of customization, community creation and expert's retrieval process need to be studied and implemented to better support and exploit social BPM benefits.

Moreover, as it can be observed in Table 2, social software principles are not fully taken into consideration while supporting BPM lifecycle. For example, although the importance of weak ties theory this principle is not well implemented in the context of BPM. Despite a large number of studies that have analysed the conceptual foundations of SD-L (Madhavaram & Hunt, 2008) (Vargo & Lusch, 2008), research on the applicability and utility of SD-L for management practice is almost negligible. Indeed, the proposed approaches in (Brambilla et al., 2012), (Dollmann, 2011), (Hauder, 2014), (Koschmider, 2010) and (De Moor, 2009) mainly support social production principle of social software in order to improve the created process models. Besides, in (Qu et al., 2008), the main principles of social software are implemented but to just support design phase of business processes and to help model creators improve the process models due to collaboration and communication with model users. SBPM have to support collaborative design of business processes as well as collaborative execution of these processes. Indeed, model users need to be supported to do their activities and resolve their problems in such continuous changing work environment.

### *5.2 Suggestions for further improvement of SBPM during execution step*

Even though related work reveals the importance of integrating weak ties in the processes management, there is no comprehensive and complete solution available in literature regarding the implementation of this theory within BPM. Indeed, weak ties are important to create new views on problems, collect important information, share knowledge and allow combining competencies if there is a tool supporting this functionality and if we know where to look. The use of weak tie allows the discovery of tacit and informal knowledge, which is normally difficult to capture in order to specially improve process execution.

Our focus is to extend the reach of SBPM for good inter organizational involvement of employees during business process execution. We aim to extend the functionalities of SBPM by answering the following: how, when, and which external actors should be included to perform processes activities? Actually SBPM is based on the idea that the collective wisdom of a crowd developed by (Surowiecki, 2005) can create better process solutions than individual

experts alone. Instead of working alone, employees have to establish and maintain relationships with one another and to perform several interactions. We talk about weak ties which are of special importance in this context as they form the long tail of knowledge as it is affirmed by (Shmidt 2009). So leveraging the collective intelligence of a business community can only be accomplished if all relevant participants are actually included and their needs considered. This leads to the nature of the knowledge involved in a services exchange. Creating a service-oriented environment and automatically finding the right people for the service dimension is key factor to improve organizational agility of business processes. Therefore, we'll support the creation of an organizational environment that enables and fosters continuous customized contributions of all stakeholders. Using the service orientation inside organization, the relationship between actors can be compared to the relationship between customer and provider, sharing services between them, based on value creation. Otherwise, actually people cannot locate knowledgeable colleagues because they are not provided with the proper means to do so. Traditional BPM and even actual SBPM do not support the skills management to answer such question "how stakeholders can find easily the right actor(s) at the right time for the right type of contribution". In a dynamic and ever changing work/business environment, actors find themselves need information and do not know where to find it. Finding the hidden connections between actors helps them to work together and share relevant information. Our goal aims to analyze and construct the social network between processes' actors, to provide answers to two important questions of "who owns what?" and "who needs what?" Thus, the central element of our approach is to characterize each performer with his owned competencies and to construct a referential of all available competencies inside organization. Based on competencies retrieval process and data mining techniques, employees can identify relevant performer(s) and capture their knowledge efficiently and easily.

## 6. CONCLUSIONS

The traditional BPM approaches suffered from several issues and a lot of works have been made in order to support BPM and improve their performance. In this paper we have discussed issues that are part of the Business Process Management Lifecycle. To better solve these issues, researchers thought to integrate social software elements in the BPM lifecycle. By employing a social approach to BPM, stakeholders can participate in process management. This allows them to contribute their own domain and method knowledge, thereby providing the necessary requirements to reduce the model reality divide and loss of innovations issues of traditional BPM. Actually, social software has to be used to support the different lifecycle steps of a business process or to support an individual lifecycle phase. The review of SBPM approaches supporting the design and execution phase of BPM have been presented in this paper. A comparative study has been done to identify gaps and what is lacked. Two key areas have to be taken into consideration while integrating social software and BPM: collaborative business process modeling and collaborative business process

execution. At design time, many people from a variety of perspectives are involved in modeling processes which is the focus of the majority of researchers. However, current SBPM approaches present their own challenges and problems that first need to be overcome. Indeed, our study shows that SBPM approaches specially support the design phase of business processes while the execution phase is seldom taken into account. Therefore, there is much to explore in order to exploit and fully benefit from the integration of BPM lifecycle and social software. Collaboration during the execution of a process means that process can be modified during execution dynamically to include unplanned participants in order to complete the work more effectively. As a future work, we'll propose an approach which supports collaborative execution of business processes to help employees resolve their own problems that can occur and help them to locate knowledgeable colleagues.

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