# Applying Social Technology to Business Process Lifecycle Management

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**Abstract.** In recent years social technologies such as wikis, blogs or microblogging have seen an exponential growth in the uptake of their user base making this type of technology one of the most significant networking and knowledge sharing platforms for potentially hundreds of millions of users. However, the adoption of these technologies has been so far mostly for private purposes. First attempts have been made to embed features of social technologies in the corporate IT landscape, and Business Process Management is no exception. This paper aims to consolidate the opportunities for integrating social technologies into the different stages of the business process lifecycle. Thus, it contributes to a conceptualization of this fast growing domain, and can help to categorize academic and corporate development activities.

**Keywords:** Business process management, lifecycle, social technology, Web 2.0, collaboration, model-reality divide, innovation.

## 1 Introduction

Organizations are currently undergoing a paradigm shift where existing Business Process Management (BPM) methodologies and organizational structures are being enhanced by emerging social technology such as wiki's, blogs, micro-blogs and instant messaging. Business Process Management can be defined as "*the discipline that improves measurable business performance for stakeholders through ongoing optimization and synchronization of enterprise-wide process capabilities.*" (Burlton, 2001). Classically, the focus of BPM has been on transactional, highly repetitive processes that can be predicted and executed according to a schema, i.e. a process model. This traditional value proposition of BPM is constrained in environments that require complementary diverse, emerging and less predictable conversations in the context of process executions.

Drawing upon this statement we assert that social technology can support a more flexible, humanistic approach to Business Process Management, designed around the agile software development concept and supported by collaborative and incremental process design as proposed by Erol et al., (2010). The movement to social BPM is

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evidenced in the literature by Silva et al., (2010) who discuss the view that business processes should not hinder human intervention, and that social technology should be embedded within BPM initiatives, especially in the modeling and execution phases of the processes lifecycle. This integration of social collaboration to crowd-source expertise and crowd-solve process issues (potentially from sources external to the organization) supports improved knowledge exchange, process requirements integration, application of situational context and increased process transparency.

The integration of social technologies in BPM is currently conducted in a number of 'trial-and-error' attempts. However, so far, and to the best of our knowledge, there is no holistic framework that summarizes the possible opportunities along the main stages of the process lifecycle. Thus, this paper is driven by the research question "*How do social technology characteristics relate to Business Process Management lifecycle activities?"*

In our quest to answer this question, we comprehensively studied related work and embedded existing practices and case studies where appropriate. This exploratory paper is structured as follows. First, we will present the selected Business Process Management lifecycle to introduce the key stages and activities that could benefit from the application of social technology. Second, we will characterize the two generic capabilities of social technology platforms that deserve attention in BPM. Third, we will interrelate the identified process lifecycle stages and these two capabilities of social technologies in an attempt to characterize the existing potential. Fourth, and finally, we will summarize our findings and put them into the context of our future work.

## 2 The Process Management Lifecycle

Business Process Management (BPM) is a set of structured methods and technologies for managing the operations of an organization (ABPMP, 2009). "*The goal of BPM is to create a process-centric, customer-focused organization that integrates management, people, process and technology for both operational and strategic improvement*" (Goeke & Antonucci, 2011). BPM encompasses methodologies and technologies for process definition (e.g. process modeling), process analysis (e.g., Six Sigma, Lean Management), process improvement (e.g., BPR, Process Innovation), process execution (e.g., Process-aware Information Systems) and process monitoring and control (e.g., Business Activity Monitoring) (Hammer & Champy, 1993; Spanyi, 2008). Originating from early organizational improvement efforts of (Demming, 1986; Taylor, 1911) the quality and improvement approach of Business Process Re-engineering (BPR) introduced process orientation to these initiatives (Goeke & Antonucci, 2011). As outlined by Silva et al., (2010), a key factor for the more recently emerging Business Process Management methodologies will be agility (Dreiling, 2010).

Business Process Management is divided into enterprise-wide and project-specific BPM (Hammer, 2007). The focus of this paper is on the latter, i.e. the way social technologies can be introduced into a project dedicated to the improvement of a business process. As the foundation of our analysis, we refer to the proposed process lifecycle model by Becker, Kugeler, & Rosemann (2001).

This model was selected on the basis of comprehensiveness, suitability to the research as well as the close alignment to the Six Sigma process improvement model DMAIC[1] (Harmon, 2007). This process lifecycle model has been applied in other published empirical studies such as Arora & Bandara (2006), Forster (2006) and Reiter et al., (2010) since it was first published in 2003.

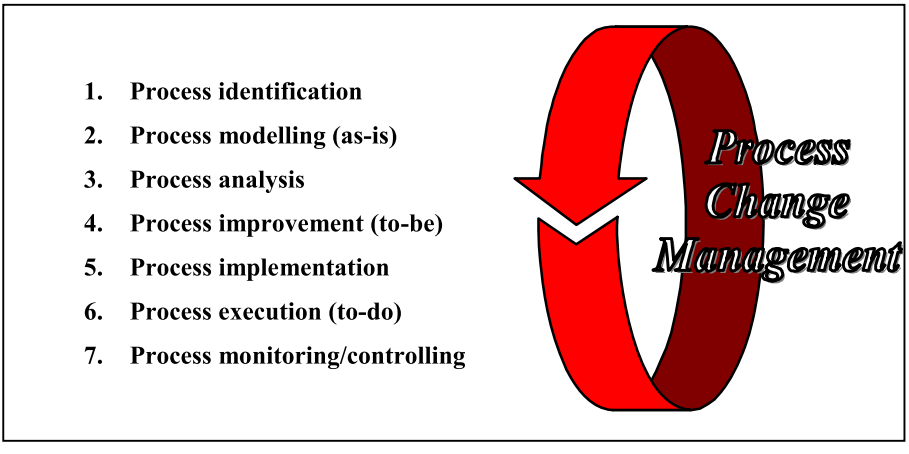


**Fig. 1.** The BPM Process Lifecycle (Becker, Kugeler, & Rosemann, 2001)

Table 1 shows the core phases of the life cycle [(column 2), also relating them to the phases of the Six Sigma life cycle phases (column 1)] and describes the objectives (via a list of core targeted tasks) associated with each phase (column 3). As specified in Table 1 (column 4), various tools and techniques can be applied in support of these tasks. From this perspective it is asserted that these tasks and associated enabling methods can benefit from a collaborative approach with the potential for introducing feedback and knowledge from outside of the modeling team. In addition, each lifecycle step has inherent risk associated with the tasks (see column 5 of Table 1) such as; process stakeholder expertise, organizational knowledge and stakeholder expectations. We believe that a more social, collaborative approach will mitigate these risks and improve the overall quality of the process improvement initiative.

[1] DMAIC – Define; Measure; Analyse; Improve; Control.

**Table 1.** BPM Lifecycle definitions (Becker, et al., 2001)

| Six Sigma | Process Life-Cycle | Objectives | Methods | Issues & Risks |
|---|---|---|---|---|
| **DEFINE** | Process Identification | Identify process priority/ Stakeholders<br>Define process goals/metrics | Stakeholder objectives matrix<br>SWOT analysis<br>Interviews/workshops | Incorrect process scope<br>Unknown process ecosystem<br>Limited participant knowledge |
| **MEASURE** | Process Modelling (as-is) | Document the process<br>Establish shared understanding<br>Identify shortcomings | Modelling notation<br>AS-IF & AS-IS models<br>Interviews/workshops | Model – Reality divide<br>Syntactic, semantic & pragmatic quality<br>Narrow focus of design (constrained) |
| **ANALYSE** | Process Analysis | Discover - Process objectives<br>Accountability<br>Constraints<br>Risk<br>Cost<br>Value | SWOT analysis<br>Six Sigma analysis<br>Scenario & Stakeholder analysis<br>Activity Based Costing<br>Root Cause analysis<br>Interviews/workshops<br>Issues Register | Stakeholder expectation management<br>Model completeness<br>Analysis skills & expertise limited to team |
| **IMPROVE** | Process Improvement (to-be) | Define improved process<br>Within constraints<br>Too expectations<br>Minimize risk<br>Process Innovation | Interviews/workshops<br>Derived from analysis<br>TO-BE models<br>Brainstorming<br>Reference models | Incremental/redesign or rethink – outcome driven/limited by team<br>Differing outcome perceptions<br>Poor process analysis<br>Ideas generation – lack of creativity |
| **CONTROL** | Process Implementation | Embed improved process<br>Change Management | Force Field Analysis<br>Project plan | Incomplete issue assessment<br>Improvements & objectives disconnect<br>Poor Stakeholder communication |
| | Process Execution (to-do) | Capture process enhancements | Automation | Technology adoption |
| | Process Monitoring and Control | Supervise & review process<br>Map process capability | Process flow audit data & log files<br>Service level agreements | Stakeholder signoff<br>Team member re-assignment |

## 3 The Social Media Landscape

Social software has been defined by Schmidt & Nurcan (2009) as "software that supports the interaction of human beings and production of artifacts by combining the input from independent contributors without predetermining the way to do this". The key outputs from this statement are that the contributors are independent, don't necessarily know each other and there is no prescribed process of interaction to follow. It is through this knowledge exchange process that social technologies can be applied to overcome deficiencies with traditional BPM methodologies. The characteristics of social technology such as the power of social interactions and the strengths of weak ties have been debated and discussed since the 1960's (Granovetter, 1983). A key development since then is that we now posses the technology to implement these characteristics.

The concept of weak ties of individuals who do not have immediate, close connections, is powerful as it can provide alternate viewpoints and divergent thinking. According to Neumann and Erol (2009), the demand for social technologies such as blogs/wikis/tagging/document sharing etc is evidenced by the introduction of these social components to leading business software applications. The authors assert that the intent is to provide more ease of use/networking/communication/sharing, accessibility & visibility, amongst other drivers.

**Table 2.** The Eight Core Patterns of Web 2.0 applications (O'Reilly & Musser, 2006)

| The Eight Core Patterns of Web 2.0 applications | | |
|---|---|---|
| **Pattern** | **Description** | **Example(s)** |
| 1. Harnessing Collective Intelligence | User participation based on the network effect where the outputs improve as more people contribute. i.e. "crowdsourcing" | Linux Wikipedia |
| 2. Data Is the Next "Intel Inside" | Use of unique data sources (knowledge) that is as important as functionality | Amazon.com |
| 3. Innovation in Assembly | Fosters innovation to create new opportunities i.e. Enterprise SOA | Google maps |
| 4. Rich User Experiences | Provide a rich user experience based on best practice software | Google maps |
| 5. Software Above the Level of a Single Device | Use of pervasive online software i.e. location aware software | iTunes |
| 6. Perpetual Beta | Adoption of continuous improvement approach i.e. SaaS | Google |
| 7. Leveraging the Long Tail | Leverage off broad reach & identify niche opportunities | eBay |
| 8. Lightweight Models and Cost-Effective Scalability | Agile development model for efficiency | Flickr |

It is in part because of these characteristics that social technology has boomed in recent years. Yet there is still no common taxonomy of capabilities that can be used to clearly define this technology landscape. Currently, the closest accepted framework is that of O'Reilly & Musser (2006) who offer a list of characteristics (presented as social network 'patterns') that define what social technology can offer. These emerging social technology platforms can be grouped under a definition of Web 2.0 as proposed by O'Reilly & Musser (2006) where "*Web 2.0 is a set of social, economic, and technology trends that collectively form the basis for the next generation of the Internet—a more mature, distinct medium characterized by user participation, openness, and network effects.*" O'Reilly & Musser (2006) lists these key principles as eight core interdependent patterns (see Table 2) which support the network effect of collaborative interaction for richer knowledge creation.

We can briefly apply each of these patterns against the process modeling phase to demonstrate the value of adopting social technology:

1. Harnessing Collective Intelligence: The overarching principle here is to establish an environment that provides an "architecture of participation (O'Reilly & Musser, 2006) where participants can add value through interaction and benefits from the network effect.
2. Data is the next "Intel Inside": This pertains to the use of the captured data (or knowledge) and using this for competitive advantage. This data could take the form of geo-location based information such as that used by the Foursquare social network (foursquare, 2011) and applied as a strategic corporate asset.
3. Innovation in Assembly: Emerging social technologies offer a diverse range of capabilities that may be distinctly appropriate at specific BPM lifecycle phases. The use of a wiki or blog could be the collaboration platform typical for the process modeling phase whereas an activity stream (e.g. Twitter) may be more applicable for the final step of process monitoring and control.
4. Rich User Experiences: Provide process model participants with best practice online applications which promote usability and a design which compels high user engagement.
5. Software above the level of a single device: The emerging use of smart-phones and other mobile devices will continue to simplify content creation and therefore provide support for data and media rich sources of information. By tapping into this ecosystem, process model participants now have access to more context sensitive information, on demand and extendable using the Web as a platform.
6. Perpetual Beta: The concept of software as a service that is always available and in a constant state of improvement provides the incentive for the process modeling team to follow the same design and adopt a continuous improvement philosophy.
7. Leveraging the Long Tail: Relates to using the Web to capture those pockets of knowledge and innovation that may not necessarily be available to a traditional process modeling environment. This 'democratized' approach of connecting both internally and externally to an organization may uncover expertise and requirements that provide innovative points of differentiation and create new market opportunities.

8. Lightweight Models and Cost Effective Scalability: Social technology platforms typically have no financial cost for access and minimal barriers to participation. This concept of doing 'more with less' via an outsourced infrastructure supports agility and mitigates the risk of expensive, unwieldy collaboration tools.

The following section looks to apply these concepts to the different phases of the BPM lifecycle and to provide some initial insights to determine a "best fit" for social technology capability applicable within BPM initiatives. The issues and benefits that can be addressed through the adoption of social technology platforms are also discussed, from this perspective.

## 4 Social Media Applied across the BPM Lifecycle

Schmidt & Nurcan (2009) have explored the different phases of the BPM lifecycle and how Web 2.0 concepts such as wiki's, blogs, and recommender and reputation systems could be used to enhance the steps of: process design; implementation and deployment; and evaluation and improvement.

Based on a comprehensive analysis of current literature, we mapped the identified process lifecycle stages against the eight core patterns of Web 2.0. The outcomes of this mapping exercise are captures in Table 3.

**Table 3.** BPM Lifecycle and Web 2.0 patterns

| Lifecycle Phase | Phase Descriptions | O'Reilly's Core Patterns for Web 2.0 Success | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Collective Intelligence | "Intel inside" | Innovation | User Experience | Pervasive Software | Perpetual Beta | Long Tail | Scalable |
| Process Identification | Understand the process scope and ecosystem in detail | ✓ | ✓ | | | | | ✓ | |
| Process Modelling | Represent the identified process via a modeling language | ✓ | | | | | | | |
| Process Analysis | Analyse process performance and issues | ✓ | ✓ | ✓ | | | | | |
| Process Improvement (to-be) | Identify and evaluate options for process improvement, consider constraints/resources | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Process Implementation | Embed improved process in the Organisation | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Process Execution (to-do) | Perform the processes manually or automatically | | | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Process Monitoring & Control | Guiding and controlling the daily operations | | ✓ | | | ✓ | ✓ | ✓ | |

From this Table, it is evident that the emerging field of social technologies can have a tremendous impact on the adoption of social technology to existing BPM practices. Current literature in the field presents how this approach is key to providing not only the software required but also a culture of collaboration and continuous, user driven process improvement. Some potential benefits of the introduction of social technology to the BPM lifecycle are discussed below. However, what is also evident

from Table 3 is that not all phases are suitable for a more collaborative approach. Each lifecycle step is now presented with discussion on the issues and benefits that can be addressed through the adoption of social technology platforms.

1. Process Identification

In this lifecycle phase, modeler collaboration to identify process priority, goals and metrics is a crucial task prior to documenting the as-is model. This concept is referred to by Magdaleno, et al., (2008) who discuss how collaboration is viewed as a distributed collective activity amongst several Actors, each performing tasks in alignment with a shared objective (Clarke and Smyth, 1993). As each person involved in the collaborative activity holds information important to the group, problem solving potential is enhanced (Marwell and Schmitt, 1975). A key point though is the importance of selecting the right process as the addition of collaboration activities may be time consuming and increase process cost for little return (Magdaleno, et al., 2008).

2. Process Modelling

The key benefits of a collaborative approach to this lifecycle phase are a more inclusive integration of process stakeholder requirements, detailed aggregation of process impediments, improved codification of knowledge and an enhanced process improvement cycle (Schmidt & Nurcan, 2009). It is their belief that this improved knowledge exchange will enhance business processes and models. The collaborative benefits of social technology are discussed in the work of Neumann and Erol (2009) who present an approach of using wiki applications to develop a collaborative open-source work-flow system. The authors believe that recent developments of social software are an extension of existing collaborative applications currently inplace to support unstructured communication and knowledge/information sharing. If a collaboration element can be incorporated in the modeling process, the benefits will be: an improved process understanding; higher quality process models; an established path for process improvement; and supports the sharing of knowledge (Magdaleno, et al., 2008).

An assertion by Rossi & Vitali (2009) is that one of the main strengths of social technologies is that they provide an array of collaboration tools (blogs, wikis, forums) that support user interaction. In support of this, Dollmann, et al., (2009) discuss how BPM can be enhanced by Web 2.0 concepts by integrating functions of cooperative modeling and using the collective intelligence of the process model user group. By employing a folksonomy approach, process stakeholders can tag their activities, share and search these tags, for the activities and comments of others (Silva, et al., 2010). Process modelers can then analyze these activities and create a new, improved version of the process model.

3. Process Analysis

Proposed by Schmidt and Nurcan (2009), the basic success factors of social technology are the creation of weak ties; the wisdom of the crowds; social production; and the view that the model consumer is a co creator of value. Erol, et al., (2010) assert that *"social software provides a better integration of all stakeholders into the*

*business process life-cycle and offers new possibilities for a more effective and flexible design of business processes"*. These social technology factors provide benefit to this phase of the BPM lifecycle. This analysis heavy, discovery phase utilizes a wide range of tools and techniques, results of which are richer for a wider range of contributors. A key risk that a social approach will mitigate is to extend the analytical expertise of the process modeling team to potentially include those with a more appropriate skill-set.

4. Process Improvement

Some key benefits from incorporating social technologies into the BPM lifecycle include the integration of process knowledge from all stakeholders; continuous process improvement opportunities due to community intelligence; workflow support; and stakeholder digital identity and reputation (Erol, et al., 2010). As discussed by Schmidt and Nurcan (2009), the intent of social software is to facilitate social interaction and collaborative production. This social production occurs without a predetermined mechanism and is driven by independent collaborators (Erol, et al., 2010). Examples of incorporating social production into business processes include the integration of Customer feedback into the product development cycle or using wikis & blogs to speed up knowledge exchange and decision making (Schmidt & Nurcan, 2009).

As presented by Schmidt and Nurcan (2009), the success of the social software and social production approach is evidenced by wikipedia.org and other open source software initiatives such as the Linux operating system.

Derived from the above discussion is that incremental, innovative process redesign or indeed process transformation can be supported by social collaboration platforms either in the form of blogs, wiki's or indeed instant messaging (e.g. Yammer). Other benefits of this self-organizing, bottom-up approach to process modeling, supported by the collective intelligence of the user community, is that the contents of process models are more visible and the opportunity for continuous process improvement by the community. Further research by Neumann & Erol (2009) has highlighted *"a shift from top down approaches in business process design and deployment to an approach where bottom-up reengineering and adaption from the user side is welcomed"*. This requirement for agility is an outcome of a rapidly changing business environment and the need to quickly adapt to process and organizational changes. Erol et al., (2010) believe that through the application of the "collective intelligence" of a process user group, in lieu of formally defining the user inputs, model users are encouraged to provide inputs in a bottom-up manner without an existing overall plan. The concept of bottom-up modeling, based on the collective intelligence of the user community, is an integral part of a social BPM methodology as it removes the hierarchical divide between process model developer and model consumer, which is often a barrier to model adoption.

5. Process Implementation

An important feature of social technologies is the ability to apply situational context through extended functionalities such as tags, links and bookmarks. It is through the retention of this contextual information that meaning can be associated with the digital artifact (Erol, et al., 2010). Through facilitating an improved exchange of knowledge and information within a user community, there will be new opportunities

to improve existing business processes (Schmidt & Nurcan, 2009). According to Jennings & Finkelstein (2009), incorporating social technologies within an Organisation has two key benefits: firstly business processes can be improved through socially supported interactions and secondly, by providing a means for human knowledge to be captured and reused by the organization. The Authors also discuss the theoretical use of "social software data artifacts" to trace data creation back to a unique digital identity so that individuals can be linked to a specific activity, expertise or knowledge. The above capabilities will assist with embedding an improved process with innovative, knowledge enhanced, practices.

6. Process Execution

During the process execution phase, a number of opportunities exist to involve social technologies. This could be the inclusion of external stakeholders in the act of voting on which path to take during a process execution or the inclusion of external stakeholders as part of the automated staff resolution.

7. Process Monitoring and Control

Similar to the preceding phase, this lifecycle step may not receive direct benefits from social technology. However, communication of process review and monitoring steps may be enhanced by the use of automated system updates or activity streams e.g. Twitter or Facebook status updates.

## 5 Conclusion

The preceding discussion has highlighted the key research areas and possible opportunities when a social technology approach is applied to a Business Process Management lifecycle. Consequently we propose that a higher degree of collaboration supported by appropriate tools will lead to improved communication and coordination of knowledge intensive tasks.

This exploratory paper presents a snapshot of current research in the BPM and social technology space and as such there are inherent limitations. The research landscape is in a state of rapid change as new technologies and business models emerge, impacting upon organizational capabilities and requirements. Further, the BPM community will face the challenges of social technology adoption, and difficulties with the facilitation and measurement of any process improvements that these technologies may bring. Future research can extend upon the discussed BPM and social technology convergence.

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