

# A Collaborative Approach to Managing Business Processes

Dr. Rachid Meziani  
IT Consultant, Kuwait  
Lecturer at Maastricht Business School  
rmeziani@gmail.com

*Abstract*— It is difficult for organizations to avoid change, as new ideas promote growth for them and their members. Change occurs for many reasons such as acquisition of new technology, new missions, vision or goals; etc. These changes are frequent and generally impact its business processes, which don't get the expected attention. Business processes are fundamental to every organization's performance and ability to successfully execute on business strategy. Before improving these processes, they need first to be designed and formalized, which is far from being the case for the majority of organizations.

This paper presents BONSAI (collaBORative busiNess proceSs mAnagement wIki) approach that attempts to offer pragmatic and simple ways in managing business processes using agile and social concepts - help bridge the gap between IT and business and brings the opportunity; empower business users in all process phases through a collaborative environment built entirely with Open Source Software (OSS). We'll also show the data collected from one pilot project that allowed us to assess BONSAI's main concepts, draw preliminary results, and initial concluding remarks.

**Keywords-component; BONSAI, BPM, collaborative approach, open source, FLOSS, business process management, user empowerment**

## I. INTRODUCTION

Business process modeling (BPM) allows private and public organizations to describe and document their business processes. If captured accurately, such knowledge allows analyzing, improving, and executing those processes with higher efficiency. In this context, collaborative and agile methodologies supported by Open Source Software (OSS) come to the rescue [1][2], and have gained growing success in many economic, technical and business domains. This is due to the fact that flexibility, in particular fast and efficient reactions to changes are more important in the information society.

Process improvement based on systems should take into account three key factors namely feedback, collaboration and change [3][4]. Obviously, these factors suggest following an iterative process. It is important in this context that the implementation approach meets the criteria that supports these principles. The key criteria to support these principles, namely in the business process management lifecycle, the modeling language and the used platform; it is an indivisible whole, on which our approach is based on and attempts to provide pragmatic solutions.

This approach does not start by saying that it must always begin with the description of the organization's mission and strategic objectives processes. Instead, it starts from a need identified by the organization's management to solve a problem. The problem has many components and the current horizontal processes may be one of them. If the problem is of a strategic nature, the intervention can be started from the mission and strategic objectives. However, if the problem is a more operational intervention in one or more horizontal processes may be all that is required. This follows the normal evolution of organizations, where a complete overhaul of the horizontal process is usually very disruptive.

We propose here BONSAI (collaBORative busiNess proceSs mAnagement wIki): an approach which aims to be not only collaborative or agile but also pragmatic. The solution was implemented using a combination of widely used open source tools which makes it attractive in many aspects, which will be detailed later; a pilot project was run with a group of employees (IT people and business users) and empirical data collected during this period, from which lessons learned and initial conclusions were derived.

This paper is organized as follow: The next section will lay down the approach's main concepts and its related lifecycle, it will be followed by presenting the platform's architecture that supports the approach and the rationale behind the open source choices made, and then we'll detail the experimentation persay and the pilot project run with a group of employees, followed by the data collection during this pilot project. These results were discussed and lessons learned derived, and finally we'll finish with concluding remarks and future work.

## II. BACKGROUND

Most of business process management approaches still work on the AS-IS/TO-BE paradigm, inherited from business process re-engineering (BPR) back from the nineties. BPR is a "top-down" holistic and transversal approach that takes months of analysis and impact assessment [5]. Problems with AS-IS/TO-BE approaches are related to the time difference between the modeling and implementation phases, coined by [5] as the model-reality divide syndrome, as well as the lack of user involvement. These problems have created a gap between the business and Information Technology (IT), the profession has always believed that ITs do not understand the semantics of business processes, while IT believe that the business has no

idea what it takes for automated processes are executed successfully. New collaborative business process management approaches [7][8] recognize the benefits of following the principles of social software such as egalitarianism, continuous and recursive assessment which focus on the involvement of all types of business process stakeholders to collaborate to their improvement [5].

### III. BONSAI APPROACH CONCEPTS

BONSAI is a collaborative approach to managing business processes based mainly on the concept of iterative improvement, and on the fast users' input and feedback, where the central paradigm is the focus on smaller contributions, and possible capture of participant's tacit knowledge. The other aspect of social collaboration comes gradually [3], allowing participants to add, delete contributions or annotate selectively with comments and / or assessments. The design motivation for this approach is that it should be light, easy to implement using open source software and supports the and highly collaborative scenarios.

We propose here a methodological approach based on the following three main phases that integrate with the traditional lifecycle of business process management [8]:

#### Phase1. Collaborative process discovery

Business Process Discovery (BPD) aims at developing an organizational profile of people, activities, technology, and information in order to understand business processes; i.e. Learning Business. Learning Business is knowledge acquisition, a set of tasks that can be the most time consuming portion of BPD. Some of the major considerations include the choice of the methods to use for acquiring specific types of knowledge [10]. In order to serve this purpose, this approach will not consist only on translating natural language descriptions of business processes but also includes guidance in the form of collaboration between the stakeholders, instructions, templates and examples.

#### Phase2. Collaborative design and modeling

The Modelling Business, from the knowledge management point of view, involves several stakeholders (coordinator, modeler, developer, and executor) into four interrelated activities: (1) model construction; (2) model revision and evaluation and (3) model approval. Model construction is an activity that transforms tacit and implicit knowledge and specific contextual situations into more structured and documented forms. The model revision and evaluation activity results from a critical review of existing knowledge about business processes. All participants may present alternative proposals that result from associating different facts and new meanings. The updating process provides support to business process model discussions and negotiations to correct represented activities and other aspects. Finally, the model approval activity concludes the interaction process and collaboration among the parties involved in a business process model specification by approving or rejecting the model. Modelling Business consists in an intensive interaction

between actors of the two dimensions, operational actors and modelers/developers.

#### Phase3. Collaborative execution and monitoring

In this phase, formal control mechanisms are designed in order to ensure that operational actors carried out real business activities as described by business models. Control mechanisms consist of three main activities: (1) compare real business activities with base business models (2) annotations/reviews and (3) identify new business descriptions.

Each annotation/review should be adding or validating new features to improve the business process. During this phase, the organizational unit responsible and operational actors will analyse improvements against oldest daily practices. In this context, operational actors will become more and more confident on suggestions of the business analyst. From iteration to iteration, confidence will increase and results will start appearing.

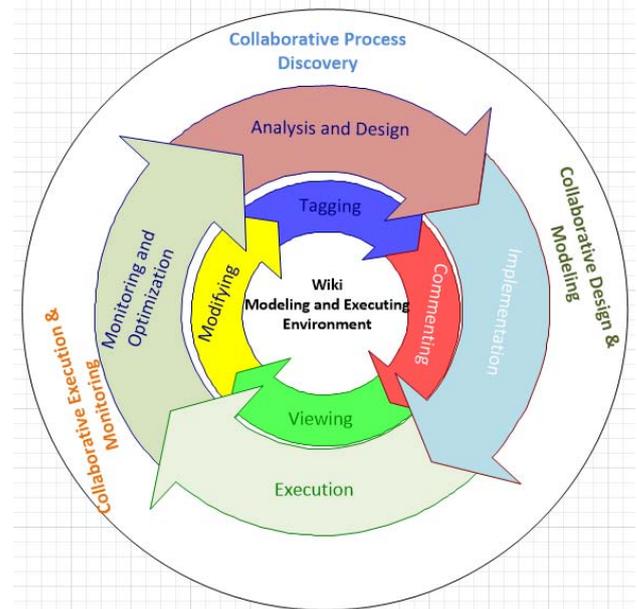


Figure 1 BONSAI Approach Lifecycle

These above steps are depicted in Figure 1. Concepts and tools that support them are shown in the center of the figure, namely social software, which makes the environment of modeling and execution, based on a wiki design principles' [11]. The second level is the traditional cycle of business process management [9]. The last level is based on social collaboration enabled by social software.

### IV. PLATFORM ARCHITECTURE

BONSAI platform is designed to be used by all business process's stakeholders. Whether users, managers, process coordinators, designers, developers, are all found on this platform with distinct roles, but for a single objective, which is the design and improvement of business processes. As we shall see a little later, the collected data provides a representative

sample of data and results that can be correlated to validate the theoretical model and the tools.

Organizations are still reluctant to share process models with its users - this actually comes from the idea that these models are too technical, therefore can only be used by technical people, namely designers and developers. BONSAI platform was designed in order to democratize the process and models for all employees, regardless of their expertise or knowledge of business processes.

BONSAI uses Wiki as engine management of business processes lifecycle. This wiki has a library of plugins that allows us to extend its basic functionality by customizing it to the organisation's needs.

Figure 2 shows the various components of the platform and their relationship. The business user interacts with the platform through the web browser and accesses the Activiti BPMN modeler, as well as the wiki for business process management, which offers direct interactions with the processes' pages, and a templates library.

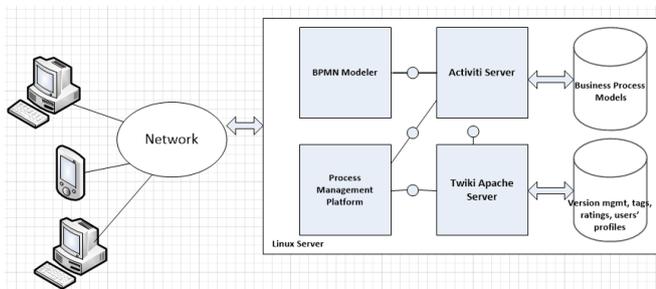


Figure 2. BONSAI Platform Architecture

### A. FLOSS in support of BONSAI platform

The widespread use of free and open source software or commonly known as Free / Libre Open Source Software (FLOSS) is a key strategic objective, not only within the free software community, but also for organizations' decision makers, because its benefits in promoting competition in the software market and cost reduction in public spending.

Realizing the benefits of free software is highly dependent on the efficiency with which the software is implemented in an organization [12]. Researchers and practitioners agree on "acceptance is the key determinant of information systems", business users use the implementation and success result [13] [14]. Neglecting the acceptance of employees may result in denial of these users, which in turn can lead to resistance that eventually results in excess of the project cost and project failures [15].

Factors for choosing FLOSS in public or private organizations are numerous and documented by several studies [16] [17]. Thus, our BONSAI platform is based entirely on free open source software (Linux as the operating system, TWiki as the wiki engine, Apache Web server, MySQL database, Activiti BPMN 2.0 process Modeler) which is increasingly used in public and private organizations.

### B. TWiki – BONSAI Platform's Engine

TWiki has been positioned as a platform for enterprise collaboration capable of fulfilling the needs of a knowledge base, a document management system, an area of project development, a support system or a variety of imaginable groupware tools [18].

The main objective of TWiki in our platform is to encourage the use of social interactions for the development of a process database. This greatly facilitates structured process information exchange and promotes collaboration scenarios. Making the means of social interaction as easy as possible also helps to create an "architecture of participation" that allows users to add value to the system by using it. Social collaboration within TWiki is particularly supported by tracking changes, commenting and rating, which was developed for the purpose of this approach; Figure 3 depicts these criteria and their meanings.

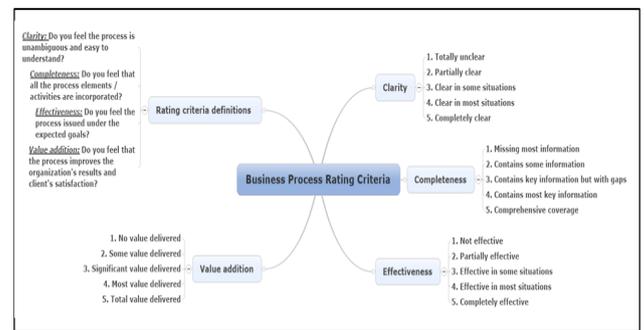


Figure 3. Business Process Rating Criteria

### C. Activiti : BPMN 2.0 Modeler

Activiti Modeler is a customized version of the Signavio open source editor. It is used to graphically create BPMN 2.0 process models, which are stored by the server on a central file system that acts as the repository of models. The modeler looks like the Visio graphics software with a BPMN 2.0 notation palette and an area for modeling the process by a simple "drag and drop". Figure 4 shows a screen capture of the modeler.

Activiti modeler maintains versions of process models that can be used in the management of process pages' versions, which are perfectly managed by all wiki engines. This guarantees integrity between the content of the process on the TWiki page and the process model in the model repository. Ease of understanding and usage of the platform opens the door to business people without modeling background to suggest changes to modelers or even change themselves simple process models.

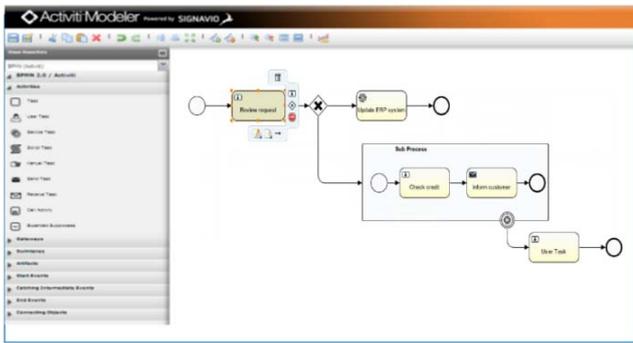


Figure 4 Activiti BPMN Modeler

## V. BONSAI APPROACH EXPERIMENTATION

Government e-services require attaining a certain level of service as they replace traditional channels. These e-services also increase the dependency of government agencies on IT services. The high quality services entail high performance, availability and scalability characteristics of other services. Define the levels of service required for such characteristics are a key activity.

We have realized this experiment in an organization that took the initiative to launch a project to customize and implement IT business processes using the ITIL framework best practices [19]. ITIL provides a systematic approach to achieve pre-defined service levels to the characteristics of different services. Identified processes, designed and implemented within the ITIL framework can be considered as a tool or a means to achieve levels of predefined services for government e-services [20].

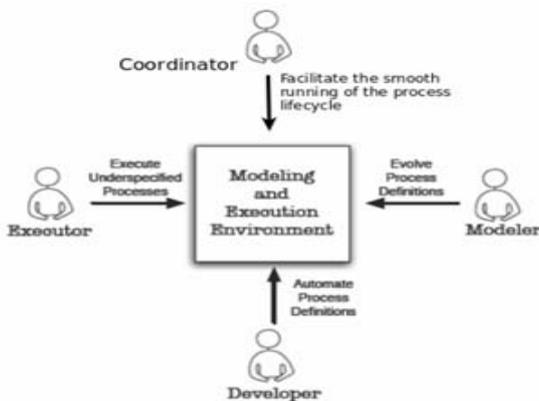


Figure 5 Modeling and Execution Environment

This opportunity allowed us to introduce BONSAI approach in one of the ITIL’s key processes, which is “change management” that we will detail a little later. The project group consists of a dozen people, among them, we find business analysts, systems specialists, ITIL experts, developers, two senior business users, and a process coordinator, according to the roles defined in our BONSAI approach (see figure 5).

The experiment starts with the establishment by the coordinator, a process structure using the available templates. Once this step is completed, the coordinator develops a

narrative outline of the process and invites other participants to collaborate to build up the process organically.

By this pilot project, we wanted to evaluate the potential of the approach in terms of agility, social collaboration, design and incremental process improvement by its stakeholders. The role played by the users of these processes will be an important indicator, since the approach is oriented towards them. Thus, as we experience a new approach in a restricted environment and a relatively short period, between February and May 2014, we chose instead to use a qualitative research approach.

### A. Operationalisation of BONSAI Approach

The approach is a combination of concepts and tools, accessible through the wiki platform with “View” mode accessible by all business users and “Edit” mode for users who signon to the system. The identification of users on the platform allows us to identify the roles defined by our approach and their respective privileges, i.e. coordinator, modeler, developer and executor (business user) (see figure 5). Taking as an example the process coordinator, he / she has the duty and privilege to define its scope and objectives, and selects and applies the correct template for the corresponding wiki page before other participants start contributing.

Before the start of the evaluation itself, we held three sessions for the group, of one hour each, which covers the main areas of our approach. The first session introduced the approach, its concepts, overall platform and outcomes of the evaluation, the second session was about the TWiki platform and its various social tools, and the third and final session, was about the usage of the activiti BPMN 2.0 modeler and its basic notations. We handed them a questionnaire to be filled during the evaluation, and advised them to complete it as they progress. The content of these sessions was made available on the evaluation platform (wiki) for reference.

Particular attention was given to participants on their respective roles. The results of this evaluation came from the analysis of data collected from the completed questionnaires, data collected from the platform as well as observations made during individual sessions we had with participants.

The process starts with the coordinator who defines its structure by using the ready made templates, then develops a narrative outline of the process, and finally invites other participants to collaborate following the lifecycle explained above.

The group of people works closely together; they can exchange a lot of information and learn from each other through the platform. Each of the roles defined by BONSAI approach executes different process lifecycle tasks with different frequency, which is summarized in Table I

TABLE I. MATRIX TASKS / PARTICIPANTS

Tasks		Coordinator	Modeler	Developer	Executor
View		++++	+++	++	++
Model	Template	++	++	-	-
	Narrative process's description	++++	+	+	+++
	BPMN process model	++	++++	++	+
Contribute	Develop Java / Perl	-	+	++++	-
	Comments	+++	++	++	++++
	Folksonomy	++	++	++	++
	Rating	++	+	+	++
	Recommendations	++	++	++	+++

Legend: Tasks' frequency executed by participants during the evaluation

++++ Very often    +++ Often    ++ Occasionally    + Rarely    - Never

**B. Process Evaluated: Change Management**

The change management process is a key process of the ITIL framework, with a mission to "facilitate the successful implementation of change while minimizing the business impact; maintain obligations and service levels meet customer expectations. The elements of the group in charge of this process are mostly from the technical department, a group of twelve people. As the process does not exist in a formal and documented way, but rather informally with some ad hoc activities, knowledge and experiences of the participants played an important role in the collaborative process mapping and design.

Following the BONSAI approach roles; group was organized as follow: one coordinator, one modeler, one developer and nine executors (users).

The goals set by the participants for this process are:

- Facilitate the introduction of new features in a timely manner.
- Minimize the risk of disruption to IT services
- Minimize incidents caused by these changes.
- Provide an accurate assessment of the cost of proposed changes before they are committed.
- Allow the absorption rate changes required for business and technology.
- Generate increased perceptions of the quality of the information.
- Balancing the need for business innovation with business necessity for the stability of service, using standard and reproducible methods for everything that happens from the Request for Change (RFC) to the post-implementation review

The sub-processes identified by the participants are as follow:

- Change management – Main view

- Establish the framework
- Revise, record, and classify change requests
- Evaluate the RFC
- Authorize / approve and plan RFC
- Coordinate the implementation of the RFC
- Prepare, dsitribute the RFC
- Review and close the RFC

Each sub-process mentioned above has its own wiki page, as shown in Figure 6.

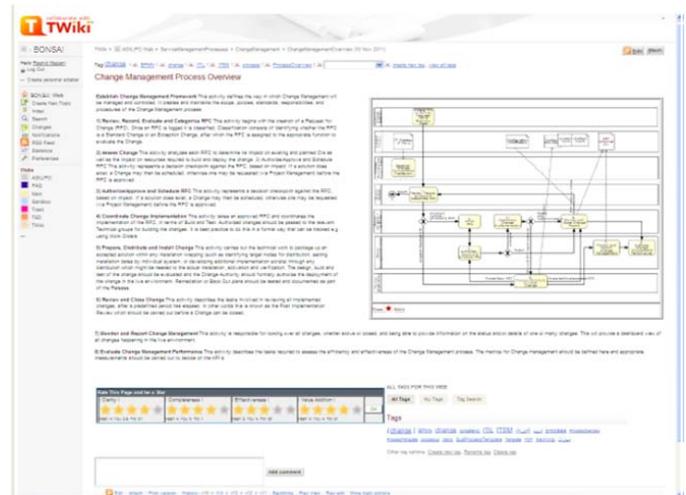


Figure 6. Example of a wiki process page “change management”

Table II shows the interaction of the participants with the sub-processes / tasks during the evaluation period. Each line corresponds to sub-process / task and its various indicators explained above. This is identified by the first column. The second column shows the number of views made by the participants, followed by the number of changes, and then the number of comments. The last four columns show the averages of the four rating criteria (see figure 3)

TABLE II. CHANGE MANAGEMENT PROCESS

Process / Sub-Process	Views	Modifications	Comments	Ratings (average)			
				Clarity	Completeness	Effectiveness	Added value
Change management – Main view	422	18	48	3.76	3.39	3.39	3.33
Establish the framework	283	14	29	3.58	3.11	3.49	2.97
Revise, record, and classify change requests	389	17	41	3.85	3.39	3.39	3.15
Evaluate RFC	356	17	42	3.59	3.11	3.58	3.07
Authorize / approve and plan RFC	325	14	43	3.66	3.76	3.66	3.07
Coordinate the implementation of the RFC	307	13	34	3.76	3.49	3.58	3.50
Prepare, dsitribute the RFC	269	20	32	3.68	3.39	3.30	3.59
Review and close the RFC	228	11	29	3.21	3.21	3.49	3.68
<b>Totals and averages</b>	<b>2580</b>	<b>123</b>	<b>298</b>	<b>3.64</b>	<b>3.36</b>	<b>3.48</b>	<b>3.29</b>

As for table III, it shows the overall roles contributions to the process. The first column shows the different roles of the participant. The next three columns show respectively the number of views, changes and comments made by each role.

TABLE III. CHANGE MANAGEMENT PROCESS CONTRIBUTIONS

Role	Views	Modifications	Comments
Coordinator	260	31	28
Modeler	238	21	23
Developer	220	6	12
Executor 1	222	8	23
Executor 2	211	7	29
Executor 3	212	5	19
Executor 4	217	0	12
Executor 5	230	6	21
Executor 6	182	0	10
Executor 7	194	6	22
Executor 8	202	5	15
Executor 9	191	6	21

During the evaluation period, participants operated in an incremental way, starting with the formulation of objectives, followed by the identification of sub-processes that form the main process. As I worked closely with the coordinator, I took the opportunity to advise to take the matters in hand when it was needed, because sometimes participants tend to lose interest in the experimentation and change focus to their usual routines. The motivation is for something, and this new way of doing things sometimes makes them uncomfortable. Luckily, some people in the group were very motivated by these developments.

## VI. DISCUSSION AND LESSONS LEARNED

During the evaluation period, participants' interactions data was collected from the platform. Before presenting this data, we present some remarks on data collected in the questionnaire completed by the participants.

One group of a total of twelve participants in the evaluation; ten of them have duly completed the questionnaire.

### A. Experience with the basic elements of the approach

We note from the analysis of questionnaires, almost half of the participants, six to be exact, have little or no experience on the basic elements of our approach at the time of the evaluation (February - May 2014). Whether on agile methods and their usage utility, concepts and tools of social and business process management, and the basics of BPMN modeling. Regarding social tools, some participants were already using social networks and were familiar with some of the tools introduced in the approach, namely the reviews, ratings and tagging.

The participants in the change management process are mostly technicians, and therefore quite familiar with the concepts introduced in our approach. They were also familiar with SharePoint system that has many similar concepts with the platform.

An interesting data that may be useful in the context of the usage of participants' tacit knowledge is that the number of years working in the same function. It happens to be high for

the majority of participants. We thus found eight participants who have more than ten years in the organization, including five in excess of fifteen years.

The majority of participants, eight to be exact, found fairly easy to use social tools and see benefits as discussed in the questionnaire: "Facilitates collaborative group work; Able to follow the progress of others work, facilitates knowledge sharing, user-friendly interface; Able to receive feedback from others Able to keep track of different versions, "but will also see some disadvantages such as:" It takes time to learn how to use the publishing tools; Annoying when sending emails, difficult to identify the contribution of each member, it takes time to combine the work of members inconsistency in the text formatting. "

### B. Empirical data analysis

In light of these empirical data collected and observations made during the individual sessions, we found that the social and collaborative aspect of participants is low, with some exceptions. This is due to the organizations' culture in the first place and participants experiences antecedent. In this context, we have to rely on a champion, who is the coordinator in our case, who must be very active and present to the rest of the group. The revival of the participants by the coordinator should be continuous until the approach and therefore the social contribution is part of their work habits.

In terms of agility, participants are still divided between the need of change of their working habits and perhaps the risk of not delivering on time. I must say that agile concepts are unknown and are not part of the organization's culture. Despite this, the participants with the help and coordinators' guidance have used previously some agile concepts such as the adoption of short cycles in terms of the analysis, design and process modeling, rapid feedback users view the data collected, and the simplicity of the documentation and mapping process is limited to the basics,

Regarding the empowerment of users, fundamental to our approach, we find that the use of the tools has been gradual, but the learning curve is very encouraging. Users have access to all the information as and when it becomes available. They are the center of the process during all lifecycle's phases. They can review, monitor, and note the contributions of other stakeholders almost in real time, allowing them unprecedented empowerment [21]. Most of the time business users are waiting for deliverables at the end of the cycle, but they still play an active role during the delivery cycle and suggest changes, improvements and corrections, which makes the design cycle process both agile and social.

## VII. CONCLUSION AND FUTURE WORK

The main idea of this approach was to empower the users and benefit from their tacit knowledge by using simple concepts and follow logical phases within an accessible social environment based mainly on Open Source Software (OSS) to collaboratively discover, model, design, and execute organization's business processes. It is also a tentative to reduce the silo effect that exists in any organization; which is

considered a major obstacle for collaboration and thus the effectiveness and efficiency of work [22] [23]

This approach attempts to offer pragmatic and simple ways in dealing with business processes using agile and social concepts to help bridge the gap between IT and business by bringing on a same platform IT people (modelers, developers) and empowered business users, who actively participate in all phases of the process lifecycle.

The use of such an approach has many implications for organizations that want to leverage the collaboration power of its human capital to provide more and better products and services to rise above the crowded field of competitors. First, the use of a wiki engine in the platform gives a social dimension and easy access for everyone. Motivated by the experience of the universal successful of Wikipedia [24], participants for the first time, find themselves empowered with the means and tools that allow them to actively interact during the process lifecycle.

In light of the analysis of the completed questionnaires and the data collected from the platform, even though the social and collaborative aspects of the participants is low due mostly to the organization's culture, we noticed that the adoption of the tools in particular and the environment in general has been gradual, but the learning curve is very encouraging. Users have access to all the information as and when it becomes available. They are at the center during all process phases.

In the future, we are looking to run other evaluations, but this time, they should cover a representative number of organization's processes in order to be able to draw more realistic data towards future improvements. We would like also to explore the motivations and drivers for users to collaborate in the business process lifecycle.

#### REFERENCES

- [1] S Nerur, RK Mahapatra, G Mangalaraj, Challenges of migrating to agile methodologies - Communications of the ACM, 2005
- [2] J. Warsta, P. Abrahamsson, Is open source software development essentially an agile method?, 3rd Workshop on Open Source Software Engineering (WOSSE 2003), 2003.
- [3] K. Swenson, N. Palmer, S. Kemsley, K. Harrison-Broninski, et al., Social BPM: Work, planning, and collaboration under the impact of social technology. Layna Fischer ed. Future Strategies, 2011
- [4] R. Meziani "Achieving Business Process Agility through a Pragmatic Approach" International Journal of Computer and Electrical Engineering, Vol. 6, No. 1, February 2014
- [5] J vom Brocke, T Sinnl, Culture in business process management. A literature review. Business Process Management, 17(2):357-377, 2011
- [6] R. Schmidt, S. Nurcan, BPM and Social Software. In D. Ardagna, M. Mecella & J. Yang (Eds.), Business Process Management Workshops Springer Berlin Heidelberg, Vol. 17, pp. 649-658, 2009
- [7] J. Mendling, J.C. Recker, & J. Wolf, "Collaboration features in current BPM tools". EMISA Forum, 32(1), pp.48-65, 2012
- [8] C. Hahn, J.C. Recker, J. Mendling.: An exploratory study of it-enabled collaborative process modeling. In: Proc. BPD '10, 2010
- [9] J. Becker, M. Rosemann, C. von Uthmann, Guidelines of business process modeling. In Business Process Management: Models Techniques and Empirical Studies, Eds.: W. van der Aalst, J. Sedel, A. Oberweis., Berlin, Springer-Verlag, 2000
- [10] A, Koschmider, M, Song, & H. A. Reijers., Social Software for Business Process Modeling. Journal of Information Technology, 25(3), 308-322, 2010
- [11] W. Cunningham, Design Principles of Wiki: How can so little do so much? Keynote at WikiSym, 2006.
- [12] F. Dengler, A. Koschmider, A. Oberweis, H. Zhang , Social software for coordination of collaborative process activities. In Third Workshop on Business Process Management and Social Software, LNBIP, 2010, pp. 396-407.
- [13] F. Davis, Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, MIS Quarterly, 13, 3, 1989, pp. 319-339.
- [14] V. Venkatesh, M. Morris, G. Davis, F. Davis, User Acceptance of Information Technology: Toward a Unified View, MIS Quarterly, 27(3), 2003, pp. 425-478.
- [15] H. Holden, & R. Rada. Understanding the influence of perceived usability and technology self-efficacy on teachers' technology acceptance. Journal of Research on Technology in Education, 43(4), 343-367, 2011
- [16] K. Crowston, K. Wei, J. Howison, and A. Wiggins. "Free/ Libre Open Source Software Development: What We Know and What We Do Not Know," ACM Computing Surveys (44:2), 2012
- [17] K. Crowston, and M. Wade, "Introduction to JAIS Special Issue on Empirical Research on Free/Libre Open Source Software," Journal of the Association for Information Systems (11:11), pp. i-v, 2010
- [18] P. Thoeny, TWiki- an Enterprise Collaboration Platform, twiki.org, 2004
- [19] OGC - ITIL3 The stationary office (All six volumes), 2007
- [20] R. Meziani and I. Saleh, e-government: Itil-based service management case study, in Proceedings of the 12th International Conference on Information Integration and Web-based Applications; Services., iiWAS '10. New York, NY, USA: ACM, 2010, pp. 509-516.
- [21] J. Bernoff, , T. Schadler, Empowerment: Unleash your Employees, Energize your customers, and Transform your Business. Harvard Business Press, 2010
- [22] F. Stone, Deconstructing Silos and Supporting Collaboration. Employment Relations Today, 31 (1), 2004, pp. 11-18
- [23] T. Fenwick, E. Seville, .D. Brunson, Reducing the Impact of Organizational Silos on Resilience, Resilient Organizations Research Programme, New Zealand, 2009
- [24] M. Ingawale, Understanding the Wikipedia phenomenon: a case for agent based modeling. Proceeding of the 2nd PhD workshop on Information and knowledge management, Napa Valley, California, ACM, 2008