Towards a Collaborative Business Process Management Methodology

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Abstract— the agility of organizations increasingly depends on their ability to set up new business processes or to modify existing ones in a dynamic manner, and rapidly adapt their information systems to these process changes. This paper proposes a new agile business process management methodology, which is part of a multidisciplinary research project – AGILe busIness PrOcess (AGILIPO). It is argued that existing business process (BPM) methodologies do not offer the necessary flexibility or agility and that new approaches are required. The new methodology is inspired on goal-orientation complemented by a classificatory framework, aimed at introducing standardization and reducing the time and effort required in the process identification phase. Wiki-based technology is proposed as the basis upon which to build a collaborative approach to business process mapping, design and re-design, supplemented by folksonomy to provide ontological support. Finally, the methodology adopts an approach to validation, which is embedded in the previous phases of process identification, mapping and design.

Keywords-component; Business Process Management, BPM, Agile Business Process, Wiki, Folksonomy

I. INTRODUCTION

In today's dynamic market environments, the only certainty is permanent change. The way that organizations have found to cope with such changes is to keep their business models flexible. Business models are made up of business processes and these are crucial in supporting a culture of innovation. However, if business processes are left unattended and not consciously adapted to the changing environment, they become impediments to innovation [1]. Since the organizations' products released to the market are generated by business processes, having them flexible is important for coping with market changes in an effective manner [2].

With the increased challenges of globalization, re-engineering is now re-emerging in the form of BPM [3]. The drive of BPM is coming from a demand for a common way to implement inter-enterprise business processes that is independent to the technology used to support them. Recent research in BPM pays more attention to flexibility as a way of coping with the unpredictability of business processes [4]. Changes are not only emerging in an organizations environment - market or society - but also within its organizational structure (fluctuation, restructure of business units, process change).

In this paper we start presenting a proposal for a new Business Process Management methodology, more human-centered, following the principles of agile software development [5], and supported by a collaborative environment. The new Agile Business Process Methodology is aimed at supporting a set of associated tools which foster the collaborative and incremental design and implementation of work processes. This is achieved by modeling and implementing business processes in a continuous cycle that receives feedback from the real use of the last implemented processes. We also focus on the human-intensive aspects of business processes, where human participation is required for the operation of activities, even if these activities are automated.

AGILIPO - AGILe busIness PrOcess - is a multidisciplinary research project that has been put forward within the scope of a wide-ranging research programme aimed at integrating the development of computer-based artifacts for organizations with the accumulated knowledge on organizational design [6]. This novel approach fosters the bottom-up design and automation of incomplete business processes, follows the principles of agile software development [5] and is supported by collaborative modeling and execution tools that embed social software-like functionalities [7].

The distinctive feature of AGILIPO tools is the integration of modeling with execution activities blurring the differences between users and designers. Users are motivated to make suggestions while executing a particular instance of the process. This reduces the gap between modeling activities and the implementation of technology. Thus, a fundamental aspect of the AGILIPO concept concerns model evolution. Suggestions are synthesized by the users/modelers/developers following a wiki-like approach [8], where new suggestions leverage on previous ones by creating new revisions of the model. In this way, we intend to foster a knowledge creation process, organically and incrementally (Wikipedia-like [9]), where contributors are motivated to participate in the modeling of an incomplete process by reading contributions of others and continuously adding their own knowledge [10].

In synthesis, AGILIPO tools will support the modeling and execution of business processes, using a wiki-like interface to read and update the processes, seamlessly integrates automated and non-automated parts of the process, supports the execution and modeling of exceptional behavior, and enforces a continuous knowledge creation process around incompletely defined and understood processes.

II. APPROACHES TO BUSINESS PROCESS MANAGEMENT

Business Process Management (BPM) is a discipline which has been around since the early 90s, launched by the article by [11] and reinforced by the book by [12] on business process reengineering (BPR). Reference [11] stressed that IT made it possible for companies to undertake major revisions in the way they did work. At the time, it was yet another attempt at bringing more efficiency to private and public organizations, drawing attention to the situation of fragmentation of horizontal processes which has consequences on delays for the customer, increases in costs of the final product and weakened competitively. The way to overcome this was through the reengineering of the work processes, elimination of layers and radical reorganization. Although it had some success in a few companies, the BPR movement fell into discredit mainly due to the "scorched earth" policy which was adopted in many of the interventions.

BPM methodologies have two major objectives: (1) to capture existing business processes by structurally representing their activities and related elements; and (2) to represent new business processes in order to evaluate their performance[13, 14].

More recently, BPM has resurfaced through the Total Quality movement and the work of the European Foundation for Quality Management [15]. Such rebirth has been championed mainly by practitioners [3] and is reinforced by a host of process-based techniques, such as Six Sigma, CRM or Business Intelligence. The so-called third generation BPM brings a different perspective to process management. It is announced no longer as the panacea to all the ills of the business but as the only way to implement strategy effectively. Each process is depicted as a response to a stimulus from the organization's environment, starting from the stimuli from the stakeholders. If high-level processes are broken down into sub-processes in close alignment with the organization's strategic priorities, it will be possible to draw process map (architecture) which reflects the strategic needs of the organization

III. REQUIREMENTS FOR AN AGILE BUSINESS PROCESS METHODOLOGY

As part of the AGILPO project, we aim to define a methodology for the incremental design and implementation of business processes. The methodology considers the human and social aspects associated with the understanding of what the organization's business processes are. Moreover, the methodology should make the description of all activities of a business process possible and should support and be supported by a set of AGILIPO-specific tools.

The agile business process proposals are characterized in the following manner [7]:

A. Incompleteness

- The process does not need to be completely understood. Trying to completely understand a process is time expensive, reducing the number of feedback cycles and increasing the chances that automated processes does not conform to organizational needs.
- The process does not need to be completely specified in the sense that it is allowed that activities not pre-specified occur in some of its instances. This allows the instantaneous adaptation of processes, instances, to the emergence of new organizational needs.

B. Empowering people

- Processes should promote collaboration, creativity and intelligence instead of restricting them.
- The system should allow people to perform unplanned activities and integrate them with planned activities.

C. Business process design should be integrated with usage of technology

- To avoid a situation of paralysis by analysis due to different perspectives on processes, a modeling approach based on the operation of the business should be enforced. This way, the different perspectives on process modeling will be focused on bottom-up leveraging of the actual operation of the business.
- Integrate the execution and modeling of the process, such that the process executor is also one of its modelers.

IV. PROPOSALS FOR AN AGILE BUSINESS PROCESS METHODOLOGY

Before going into the methodology proper, it is important to highlight the nature of our approach. Above all, the methodology we put forward in this paper aims to be not only agile but also pragmatic. It does not start off by saying that we always have to start process mapping from the company's mission and strategic objectives. Rather, it starts from a need identified out by the organization's management to solve a problem. The problem will have many components and the current structuring of the horizontal processes may be one of them. If the problem is of a strategic nature, then the intervention may need to start from the mission and strategic objectives. However, if the problem is of a more operational nature, 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 horizontal processes is usually highly disruptive.

In the strategic or top-down approach, the new processes can be designed based on the business strategy and business plan without being limited by the actual process. This approach is

suitable for full optimization. In the bottom-up approach, the business process is modified from the perspective of users or operators. The focus tends to be on small improvements to the executing process, and the business process can be improved on an iterative basis. This approach is more suitable for local optimization. Both of the top-down approach and the bottom-up approach are necessary. If only the top-down approach takes place, it is likely to cause the functional failure of a centralized organization. On the other hand, if only the bottom-up approach is emphasized, the silo system will be maintained and full optimization will be difficult to achieve.

Considering the discussion above, we propose a methodological approach based on the following steps (Figure 1):

(1) Defining the process according to its goals
(2) Defining the process according to its agency and context, using a classificatory framework based on organizational routines.
(3) Describing and modeling the process using a wiki-like approach, where collaboration, user empowerment and tacit knowledge usage are key principles
(4) Fine-tuning the description through an ontological approach known as folksonomy
(5) Validating the process through short feedback cycles.
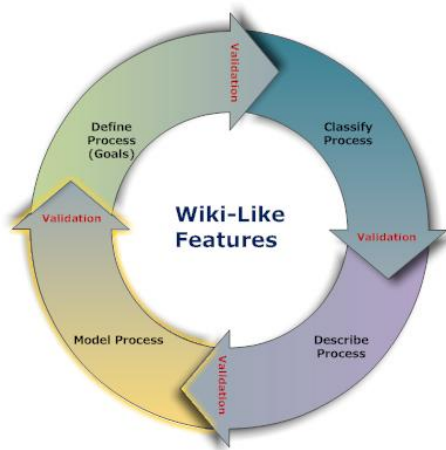
These will be discussed in turn.

Figure 1.   AGILIPO lifecyle

A.   *Definition of the process: goal-orientated*

Goal-orientation mirrors the approach we take to goals in our own lives and lends itself to business user involvement in the creation and management of processes .This also extends to routine tracking of plan execution to detect problems as they occur, or even better before they do, in order to take timely and appropriate actions.

A process can be considered a defined set of partially ordered activities intended to reach a goal. Goals are not only used as a starting point of development but serve as criteria to evaluate actions and decisions throughout the design [16]. At the base of this approach we find goals, which express intentions and

capture the reasons of the system to be built. Furthermore, they represent statements which declare what have to be achieved or even avoided by a business process [17]. This step looks to define and answer the following questions:

- Why something needs to be done? (define goals)
- What needs to be done? (define activities and output)
- When does it have to be done? (define logical dependencies between activities)
- By whom has it to be done? (define roles - carried out by human or machine actors - and assign them to activities)

Each goal or sub-goal manages a single item or a set of highly cohesive related items. This results in discrete processes that are cleaner and more likely to be reusable. Let's take a business, which is actually organized into vertical business segments, where end-to-end business exists, and horizontal functions spanning across these segments. Each horizontal section manages specific items "process components". Goal-oriented approach allows for the identification of the sub-goals associated with end-to-end business processes. Once sub-goals are identified, it is easy to identify those that are common across vertical segments or horizontal functions and therefore candidates for reuse.

B.   *Definition of the process: classification*

On the topic of standardization (and eventual reuse) if we know the process type(s) and the process instance(s) that we are dealing with, this will save much time and effort at the outset. Classification of processes is a method which has been talked about in the literature. There have been many initiatives aimed at cataloguing generic business processes, each proposing classifications of their own, including the MIT process handbook [18] or the Process Classification Framework by the American Productivity and Quality Center's International Benchmarking Clearinghouse [19].

Organizational routines are an area of research which has not been properly exploited in the BPM literature and which can be usefully applied to business processes. Defined as "a repetitive, recognizable pattern of interdependent actions, involving multiple actors" [20], routines offer a researchable link between the organization as snap-shot and organizing as a process [21][22]. Routines provide an observational "window" to the drivers underlying organizational change and thus can be of use in providing also a frame of reference for agile business processes. This is the case of the research carried out by [23], where an argument is put forward for both flexibility and persistence of organizational routines.

In [23] conclusions are that although pervasive and persistent, organizational routines allow for a considerable amount of variation. Also, that such variation is due to individual and collective agency, with tacit negotiation between participants being an important factor in the collective performance of a routine. Furthermore, that author states that organizational context, specifically "aspects of the technology in use, the patterns of coordination and the culture" have a strong

influence of the performance of the routine under investigation. The outcome of Howard-Grenville's work is a type of classificatory framework which places a given routine in its agency and organizational contexts. We suggest that if this kind of thinking is applied to business processes, there would be a great deal to be gained in terms of categorization and standardization at the identification stage. Table 1 show the proposed classificatory framework applied to business processes.

By introducing a classificatory framework which is relevant to organizational routines (and therefore to business processes) in a BPM methodology, we hope to fulfill two objectives. Firstly, we aim to address the problem of the lack of contextualization of most methodologies. In other words, business processes are usually mapped and designed independently of the people who carry out the work and also independently of important organizational variables, such as how much flexibility is allowed in the execution of a given process by a given manager. Obviously, it will be possible to predict every possible variable which forms the organizational context of a given business process, but it is possible to characterize the process a few key variables, such as those represented in Table I.

Our second aim is to improve the agility of the mapping-design-execution cycle. By pre-classifying each process into a category (for example "Adaptive", "Sticky" or "Pervasive") it should be possible to reduce greatly the amount of time needed to carry out the cycle, simply by instituting different sets of rules for each category. Such rules would affect the whole process, from the manual mapping to the automated execution of the business process.

C. Wiki-based collaboration

The wiki tool is an open authoring environment for creating and maintaining a community knowledge base, offering a quick, simple way to produce and review information that can be gathered and linked to other wiki pages. All users can comment on, change, supplement, and even delete the wiki's pages. Producing new pages is quick and easy, as is linking them to existing ones [8]. The wiki is a suitable solution for IT support of cooperative community knowledge generation [24]. The wiki's winning feature, however, is that it provides a simple means of interaction due to the simplicity with which users can navigate its pages. The line between the "active" content purveyors (authors) and the "passive" users is largely eliminated, resulting in the rapid appearance of a knowledge network of wiki pages and sites [25].

In the context of an agile BPM methodology, we proposed that a wiki-type tool can be created for the collective description of business processes. In this context, three aspects may be considered when evaluating wiki-type scenarios:

1. The degree of organization of the BPM team
2. The degree of specificity of wiki objects (goals, sub-goals, activities, roles, etc…)
3. The degree of desired process completeness

The first aspect concerns the policy making needs regarding collaboration and access rules for the team in charge of the BPM project. While in the case of wikis for web pages, creating and editing have a simple underlying workflow and do not raise too many concerns about consistency, the mapping and description of a process (e.g. sales order) involving a number of participants from different organizational units, would have to be based on strict transactional rules in order to ensure data consistency.

The second aspect encompasses the data structure of a wiki-object and the degree to which it should rest on a formal underlying definition [26]. Any system that plans to support emergent activity, following a situated action approach, should provide some structure as a contextual basis for situated improvisation. Process maps (in analogy to geographical maps) can provide such a structure.

As a third aspect, one should consider the degree of desired process completeness versus the continuous evolution versus development of a final version. From a social intelligence point of view, we can observe that the more collective intelligence is required for a given task, the lower the degree of organization the task is required to have. In other words, a broad community participating in the development of an artifact increases probability of its completeness.

Users/modelers/developers that are involved in the modeling and execution of the business process, synthesize suggestions following a wiki-like approach, where new suggestions are leveraged on earlier ones, thus creating new revisions of the model. In this way, a knowledge creation, Wikipedia-like process, is created in an organic and incremental manner [9] [27]. Contributors are motivated to participate in the modeling of an incomplete process by reading contributions of others and continuously adding their own knowledge [28].

D. Folksonomy

Folksonomies are an emergent phenomenon of the social Web. They arise from data about how people associate terms with content that they generate, share, or consume [29]. It is claimed that Folksonomies have many advantages over controlled vocabularies or formal taxonomies. Tagging has dramatically lower costs because there are no complicated, hierarchically organized nomenclatures to learn. Users simply create and apply tags on the fly. Folksonomies are inherently open-ended and therefore respond quickly to changes and innovations in the way users categorize content [30].

The folksonomy approach is used here in conjunction with the wiki-like approach enabled by the wiki-based principles for the description of pre-defined processes. It is also used for the bottom-up identification of common behavior in different process instances. Such bottom-up process type definition occurs in the execution context of incomplete processes. Generic activities support process exceptions, where any unplanned exception can occur as a generic activity. Such generic activities may be integrated later in the classificatory framework, becoming known exceptions. Known exceptions,

TABLE I. PROCESS CLASSIFICATION

Embeddedness of the process	Actors' primary orientation	Flexible process performances?	Changes in process over time?	Process label and characteristics over time
Weak • Overlaps with few other structures • Overlap is relatively insignificant	To past (Iterate)	Unlikely	Unlikely	Arbitrary Process: It changes only as a result of intentional redesign or unintended slippage
	To present (Apply)	Likely	Somewhat likely	Pragmatic Process: It changes readily as a result of emergent variation; responsive to shifts in situation
	To Future (Project)	Likely	Likely	Adaptive Process: It is relatively easily adapted to new uses; many variants may coexist simultaneously
Strong • Overlaps with many other structures • Overlap is significant and consequential	To past (Iterate)	Unlikely	Very unlikely	Sticky Process: Very persistent; little impetus or change from within
	To present (Apply)	Likely	Unlikely	Accommodative Process: Pragmatically allows flexible use to apply to situation at hand, but variations rarely perpetuated
	To Future (Project)	Likely	Somewhat unlikely	Pervasive Process: Rather than changing over time, the process may "take over" more problem situations and become more widely applied

Source: Adapted from Howard-Grenville (2006)

in turn, can be further integrated into the process type, becoming expected exceptions.

E. Validation

An important point that is not covered by the current modeling approaches is the incomplete nature of business process [31]. The modeling of business processes is never finished because the process itself is never complete. In order to overcome such a realization, a validation step must be adopted [32]. Validation should give immediate and continuous feedback to business process designers about weaknesses and inconsistencies in possibly incomplete models. The established modeling process with sequential modeling, validation and evolution stages should be replaced by a modeling process with integrated validation support.

Validation addresses the problem of ensuring the consistency of the model vis-à-vis the real-world process and requires consultation of the specification and discussion with process stakeholders, before it gets to the live environment [33]. For instance, simulation facilitates process diagnosis in the sense that by simulating real-world cases, domain experts can acknowledge correct modeling or propose modifications of the original process model [34].

In our proposed methodology the step of validation of the business model represents a departure from traditional software testing by focusing more on the reality of organizational life. In order to stay in line with the agility that we put forward in the AGILIPO approach, validation should not be a lengthy process, as suggested by many other approaches [33]. The tight collaboration between users/modelers/developers jointly involved in process mapping and design, facilitated by wiki-like technology and

by access to a federated graphical view of the business process model, should greatly ease the validation process. The use of these tools should provide immediate and continuous feedback to business process modelers about weaknesses and inconsistencies in possibly incomplete models.

Hence, our suggestion is that validation should be embedded in the previous stages of process identification, mapping and design. The reliable use of a classificatory framework as suggested in section D above, the adoption of a simple ontological system based on folksonomy and the feedback gained from frequent inspections of the graphical representation of the business process model designed through a wiki-like tool should provide sufficient validation opportunities.

V. CONCLUSION AND FUTURE WORK

Business processes methodologies are in need of major revision. While the field of BPM has introduced noteworthy progress in the computer and human support for handling business processes, more advanced approaches are necessary in order to meet the challenges of business agility. Current modeling methodologies address few aspects of the real needs of today's organizations. They overlook the fundamentals aspects that will allow organizations to be agile, and they still enforce the separation between designers and users.

In support of the AGILIPO concepts, we propose a methodological approach based on five complementary steps: (1) identification of the process goal(s), through an inherently flexible approach, which allows processes to be identified following the logical ways in which humans naturally comprehend processes; (2) classification of the process using a framework derived from the field of organizational routines,

thus allowing a degree of standardization in the subsequent design phase; (3) description in a wiki-like approach for the mapping and design of the process, where collaboration, user empowerment and the harnessing of tacit knowledge are key principles and (4) Modeling the process and fine-tuning using folksonomy-based ontology concepts, where users tag activities, share their tags, and search for activities based on such tags; (5) validation procedures embedded throughout the identification, mapping and design steps of the method.

In our future work we will focus on developing each of the five steps in detail and simultaneously carry out a practical test in a live business process. In the detailed development of the methodology, there are a number of issues which are still to be resolved, namely (1) how to downscale the Wikipedia-like approach to the organization level, where relationships between participants tends to be functional or hierarchical; (2) how to carry out the federated graphical view of the business process model as mapping and design progresses enabled by the wiki-like tool; (3) what is the acceptable degree of completeness of the business processes and how can they be validated reliably; (4) what other types of social software are suitable for an agile BPM methodology (e.g. blog, IM, tagging, social bookmarks, ratings), and (5) how to combine harmoniously and effectively the bottom-up elicitation of horizontal processes with the top-down or strategic shaping of the same?

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