A Breakthrough Business Process Management Approach Based On IT Support

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Abstract. 30 years after its beginning, and despite its uncontested benefits, the Business Process Management (BPM) worldwide maturity level is still very week. This observation exposes the increasing need of supporting more efficiently the industrial implementation of a BPM approach. As a matter of fact, remaining competitive and getting certifications mainly caused company processes to reach a certain level of complexity making the modelling stage too complex to be made by anyone, like it used to be and would probably remain. The following PhD subject believes that an adequate IT tool could support the BPM approach, and especially its modelling stage, by handling structural information for the designer: from Business Internal Information to External Regulation. The project has the objective to create an assistant capable of generating a process cartography (composed of multiple business processes) following given rules, helping business reaching defined goals, and corresponding to previously input resources, missions or skills. To fully explore the impact of the resulting assistant in an industrial context, every future development will also be completed with a business oriented user interface and will be tested in the field.

Keywords: BPM approach, IT support, Process Model Generation

1 A gap between the theoretical BPM Approach and industrial BPM Maturity Level

1.1 State of BPM today

Every organization is composed of a set of activities executed in order to achieve at least one objective [1] which can be formalized in a business process. Business Process Management (BPM) is a process-oriented methodology designed to improve organizations' performance and compliance [2]. In practical, BPM is an approach supporting the understanding of the overall behaviour of an organization, using methods, techniques, and software to design, enact, control, and analyse operational processes [3].

J. Ralyté, B. Roelens, and S. Demeyer (Eds.):
PoEM 2017 Doctoral Consortium and Industry Track Papers, pp. 25-33, 2017.

Created in early 80s, the BPM methodology has the objective to develop the habits of [4]:

- Modelling internal operations;
- Running those process models;
- Collecting data and calculating resulting Key Performance Indicators (KPI);
- Detecting bottleneck activities, process incoherence(s) and ways of improvement.

Re-modelling steps (starting from the second cycle) are also called Business Process Reengineering (BPR) [5], it consists in modelling an improved business process based on deduction from the previous cycle to start again a new cycle.

Despite the fact that many organizations have reported the dramatic benefits (agility, productivity, reduced risks, compliance…) gained from the successful implementation of BPM since the 90s, as explained in [6], the BPM approach has not settled yet as a suitable strategy for the improvement of internal performance in more common-sized companies. According to [7], 60 to 80% of BPM initiatives fail. [8], [9] and [10] all identify an Adequate Alignment of IT Infrastructure and BPR Strategy as a key success factor for implementing a BPM strategy. But despite the natural partnership that has always existed between BPM and information technology [11], industrial engineers have still not fully exploited the idea of taking better advantage of IT to implement a BPM strategy [12]. This is why, this project aims at fully exploring the reasons of (RQ1) *why are industrial BPM implementations not reaching a higher maturity level* and therefore (RQ2) *how could the BPM implementation methods be reconceived in order to ensure industrial successes.* This paper presents first observations and research directions concerning RQ2.

Most of industrial approaching the BPM methodology were, and still are [6], discouraged from the start by the length, the complexity or the fundamental organizational changes required by the method. Moreover, it is estimated that organizations with best BPM results spent more than 40% of the total project time on modelling their first business process. Despite this observation, modelling tools have still not been considered as process model generators, apart from IT tools dedicated to process mining. As a result, companies investing in modelling tool, hoping it would help them implementing their BPM approach, will still have to face a long and complex stage of process modelling before getting any results [13] and [14]. Yet, given the sharp learning curve, most of them will not be able to produce any process model.

Process models are composed of two dimensions: functional information (meaning the tasks, the core business) and their structuration (their sequencing) and IT should at least be employed in reducing the complexity of the automatable dimension for industrials; the creation of the structure.

The BPM strategy consists of a cycle of four stage (Model, Enact, Control, and Monitor a company's internal business processes) in order to conduct continuous improvement on business' activities. Each cycle of the BPM approach begins by (re)designing process models and is usually made using modelling tools. International surveys conducted since the 90s reveal that companies are facing real difficulties to get their first models

and this work believes that industries could benefit from a better IT support to model their process as suggested in [15].

1.2 Issues Information Technology should address to support the BPM approach

The old fashioned, complex and long modelling procedure to get certified. With the interest of having formalized processes being proved, 90s marked the beginning of the development of a bench of paper-based modelling languages. Companies began to learn designing their businesses using a top-down approach of BPM [16]. This approach consists in modelling from macro-processes; representing the company main strategy and orientation, to event-driven models; the operational sequencing of tasks. Later during the 2000s, the development of new technologies made companies invest in modelling tools allowing them to electronically model their businesses just as they were doing it on paper, and very soon after to enact them using workflow engines.

International surveys conducted from 2008 to 2015 [6] show that, in practice, industrials face real difficulties in conducting a BPM approach. KO et. Al. reveal, in [18], that the increasing number of BPM software has given rise to much confusion and obstacles . This observation constitutes the grounding of this PhD which would like to consider IT as being able to reconcile industrial with the BPM approach by answering this first research question: *How could IT support the modelling stage in a business oriented discussion with designers?* And consequently: *How could the modelling stage be driven by goals, KPIs and skills?*

The significant number of requirements businesses want to meet. As years went by, business constraints and characteristics fundamentally changed: internal regulations got clarified and procedures gained in complexity to remain competitive [19]. The increasing number of regulations, norms or internal constraints businesses want to abide to, made designers task more and more complex. As a matter of fact, involved rules mostly require the (sometimes incompatible) presence (or sequence) of activities or data, making the designing stage unbearable [20].

Given everything these input information imply for processes, they constitute an important element of the modelling stage. We believe that what designers take into account to model their processes could be automatized and that it is becoming urgent to take over the handling of control objectives from the designer role. With the proper IT support, the person in charge of modelling the organization would only have to focus on customizing a processes already abiding to internal and external political and cultural issues. This issue can be summarize with this research question: *How could the modelling approach be reshaped in order to always get compliant processes?*

Absence of correlation between getting certified, formalizing processes and conducting process improvement. Modelling business processes is usually undertaken for three reasons: (i) getting certified, (ii) conciliating computer systems with the organizations inner operations and (iii) having a continuous improvement approach. Because of the correlation existing between their structures [17], it is becoming urgent to

consider those three goals as linked. Thus, this project thinks that modelling should take (i) desired certifications, (ii) IT infrastructure constraints and (iii) process agility notions, into account as input to generate desired process models similarly as [21], [22] and [23]. This is why the third addressed research question is: *How could a cartography of processes be deducted from a set of (i) business information and a set of (ii) rules and certifications?*

2 Information Systems as a solution to reshape the Business Process Management

To address all these issues, the main goal of our project is to contribute to the re-design of the BPM approach with a suitable IT support and has the ambition of making it more accessible for organization no matter their actual BPM maturity level. This project also claims that the BPM modelling stage should soon be switching from a mode where process models and BPM approach were to be supported by humans to a new period were they could (and should) be carried out by modern IT infrastructure. These observations constitute the purpose of the thesis: if resulting developments manage to lead businesses during their BPM approach by taking the three points raised in paragraph 1.2 into account from the beginning of the modelling stage, it would constitute a major progression for BPM research and it would certainly increase the world average maturity level [5].

3 An assistant to help during the modelling stage by handling various constraints and goals

Our team thinks that a proper IT support could considerably reduce the time needed to get a first proper process complying with every internal constraints and eventual desired certifications. The main contribution that this PhD would like to provide is to consider modelling software as being able to take into account everything currently thought of by designers; from business information to external influence (see **Table 1Table 1**). This is why the PhD will first investigate how to gather and store business information, constraints and associated consequences for processes. In a second phase, the PhD will focus on generating multiple process models representing a nearly-complete cartography and corresponding to all this input information.

Table 1. Input information used when handmade modelling business processes

Business Internal Information [22] and [26]	**External Influence** [27] and [28]
Goals & Deliverables	Good Practice
Missions	Certification
Data	Legislation
Existing models & procedures	Regulation
Applications	Guidelines

Human Resources & Internal Skills Cultural practice & Habits	

Nowadays, process designs are built from different information such as un-formalized existing procedures, human resources and internal goals (Business Information) but also legislation, certification or even good practices (see the Structured Analysis and Design Technique (SADT) representation of the envisaged approach **Fig. 1**). All these data can affect the business process cartography. The method being investigated in this first phase of PhD is to build the business cartography given the two different flows of input information apart from each other.

The first phase being developed is to build the meta-models needed to design (a) Business Information and (b) External Rules. The project currently consider that two different meta-models are required; one (a) to depict companies' habits, rules, hierarchy and procedure, and another (b) to create the rules that should be verified in order to respect a condition (such as getting certified, follow legislation, being environmental-friendly…). The first reason of this distinction in the needed meta-models is due to the impact the information will have on the generated cartography; (b) is about having requirement fulfilled or not, whereas (a) is a about reaching goals and being closest to a defined target. Secondly, it is mostly due to the profile of users that will create the models; models from (a) will be designed by managers and workers whereas models from (b) will be made by experts and consultant specialized in the rule they want to create, these latter are not necessarily part of the company. For these reasons, the PhD first considers two different Meta-Model to represent the two input information, but is aware that, in the second phase, these two Meta-Models might have to be merged into one.

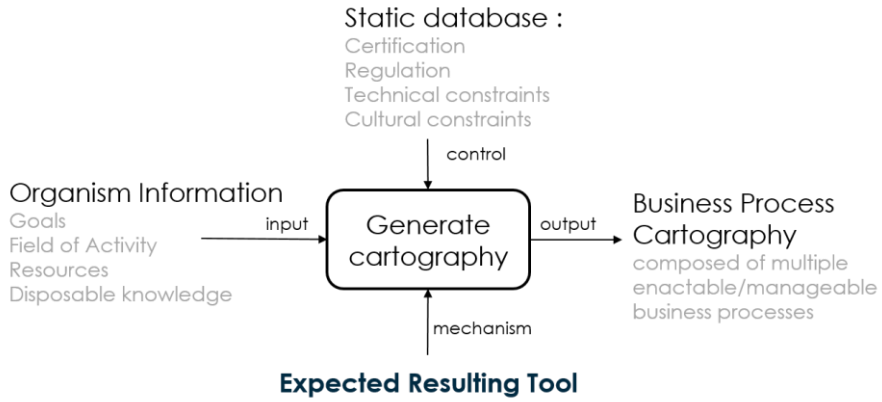

Fig. 1. SADT representation of the envisaged approach

Businesses failures in trying to implement a BPM strategy, despite satisfactory academic results, reveal that, although effective when handled by qualiticians, the method

is not enough appropriate in an industrial context. This project believes that it is becoming urgent to consider industrials as the main actors of process management.

First observations highlight the fact that businesses only talk operational languages, which mostly correspond to the last level of the top-down approach. Therefore, this PhD will investigate the possibility of providing businesses with a framework they can understand in order to gather expected input business information for the process generation. Thus, the development of the two user interfaces that will be created for both types of input information will raise the question of the language to use in order not to fall into the pitfall of having a non-business oriented language only designed for specialists.

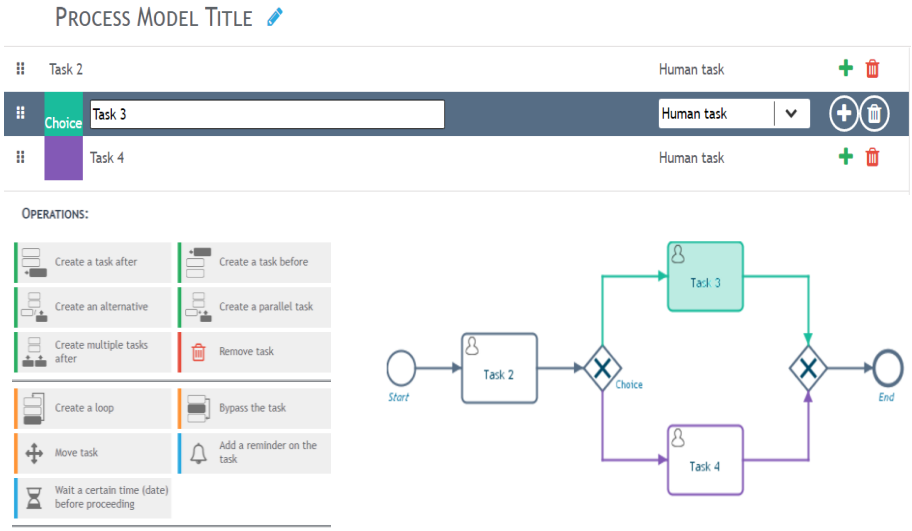

Fig. 2. A table-filing based language to gather business tasks and generate business process models

Concerning this last point, this PhD is investigating the reuse of the results obtained during the six-month research project conducted last year to gather *existing models & procedures*. The developed algorithm aims at converting a table of tasks into a process model according to their preceding or succeeding links (see **Fig. 2**). The table is filled thanks to business-oriented actions corresponding to very specific patterns. A survey is currently being conducted among potential users to evaluate the easiness of the tool. By using this functionality, the PhD could take advantage of the table filling language (based on industrial habits) to complete process models.

4 Goals and Future Work

First, the main difficulty the subject will face resides in the social aspect that is involved. This PhD believes, and will deeper investigate in future works, that a proper IT

support could help avoiding social barriers or raising some that are nowadays blocking industrials in implementing a BPM strategy.

The two main goals of this PhD are to produce an IT tool in charge of (i) generating enactable business process models from input information such as business information or desired certifications and (ii) facilitating the implementation of a BPM strategy and the process of getting certified.

This PhD will first keep on focusing on the two information flows by building the meta-models for the two input and control flows (see **Fig. 1**).

As a more long-term goal, this PhD will have to take an active interest in constraint and objective based modelling. The envisaged methodology involves considering the two input flows apart from each other. In that way, if each case study (describing only one input flow) used is complete enough, each part of the algorithm to generate the business cartography can be conceived separately. Obviously this method also involves creating a new uncomplete example (with Business Information but also some rules to abide to) to combine the two part of the algorithm and generate a cartography mixing all requirements.

5 Methodology to address RQ2: "*how could the BPM implementation methods be reconceived in order to ensure industrial successes?"*

For first cycles of development, case studies will be built to evaluate efficiency and relevance of early developments. Experimentation and surveys will then be conducted simultaneously in specific industrial contexts at the end of each development cycle so that results can efficiently be evaluated. First, questions will be asked to French companies which already have (or have tried to implement) a BPM strategy to validate or invalidate the facilitating aspect of the proposal compared to the tools they currently use. Then, the survey will also be intended for those who are not in the process of implementing a BPM strategy and who are facing beginners' barrier such handling regulations or having modelling issues. Each evaluation conclusions will then be used as an input for the analysis part of the next development cycle so that the upcoming results will solve remaining issues. Finally surveys will contain particular questions to determine how much business-oriented the tool is becoming.

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