

# Support of Decision Tasks in Business Process Improvement

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**Abstract.** The vigorous technological development of the world is a key driver of the continuous improvement of business processes at the enterprise of today. For staying competitive, the companies have to be able to adapt to changes of business environment quickly and effectively. The conventional approaches to business process reengineering are based mostly on activity flows, and mostly not considering data of business processes. In the paper we present a hybrid approach to business process improvement, in which both activities and data of business processes are taken into account. As well, we introduce a concept of the decision task as a special kind of the business process and propose an approach for its improvement based on decision theory, which grasps all the stages of the business process lifecycle.

## 1 Motivation

Business process management has proved itself as a sustainable management approach and a competitive advantage of the enterprises where it is used. However, such factors as rapidly emerging technologies and instability of the market-driven economies, push enterprises to continuously rethink the ways of running their businesses. For facing such challenges, the industry needs efficient methodologies of business process improvement, which will provide the companies the ways to effectively and quickly apply the needed changes.

The interest to business process reengineering is reflected notably in a large variety of scientific literature where the fundamental approaches to business process redesign are presented [5,1]. The literature analysis shows that the most existing improvement techniques are bound with the activity flows and mostly do not take the business process data into account. However, "process and data are equally important for business process management" [2], and taking the business data into consideration will complement the approaches to business process improvement.

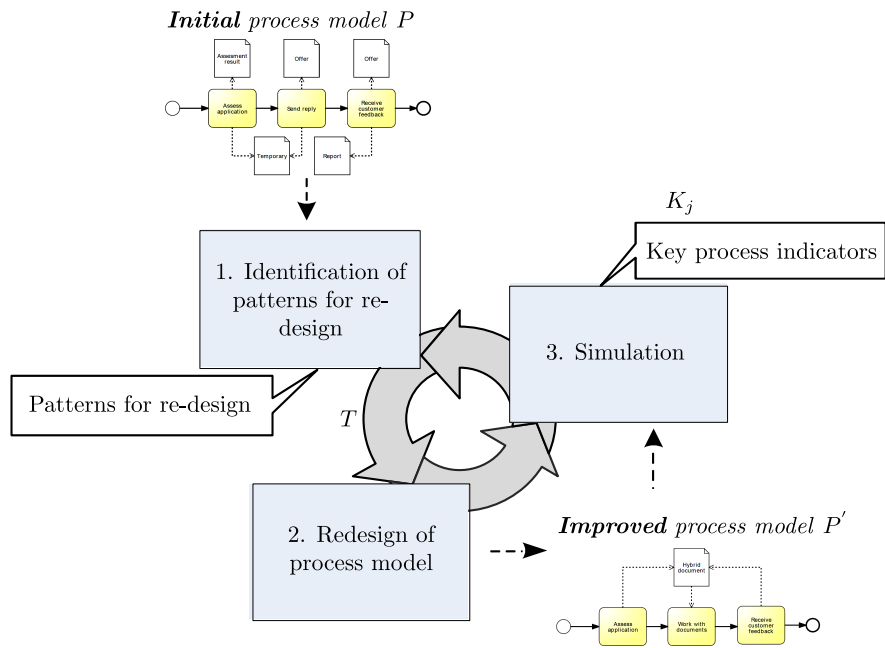
The pursuit of ways of effective business process transformation shows that similar business processes often have different execution outcomes as a result of uncertainties of the business environment. For example, the business process of time management at the enterprise can change to a great extent depending on the information about the preferences of the customer for the scheduling of meetings. In reality, making a choice under uncertainty can result in unnecessary time

and money investments and non-optimal business process management, and the companies need effective ways of dealing with such challenges. This has become a premise for us to apply the decision theory for business process management as a mechanism for dealing with processes of making decisions under uncertainty.

More specifically, we present the generic scheme of business process reengineering and we introduce the decision tasks as a special kind of business processes by mapping the objects of the decision theory and the business processes. Furthermore, we provide the approach of improvement of the decision tasks at all the stages of the business process lifecycle, by defining the payoff function of the process and proposing the outlook for its optimization.

## 2 Business Process Improvement

The business process lifecycle traditionally starts with the design and analysis phase, during which the business processes are identified and reviewed, mostly at the modeling level [6]. In Figure 1 we present our approach to business process improvement, which addresses this phase.



**Fig. 1.** Generic scheme of the business process improvement

As one can see from the figure, the object being exposed to redesign is a process model. It can be chosen, for example, by the business analyst which

supposes that the current process model is not efficient. The first step of the improvement approach is reviewing if the initial process model  $P$  contains a pattern for redesign, which could be potentially improved by a transformation  $T$ , yielding as an outcome an improved process model  $P'$ . The logic and structure of the pattern and the transformation approach are provided in such a way that it refines the business process, which we will present in more details later in this section. For testing if the improved process model  $P'$  is more efficient than the initial process model  $P$ , the simulation phase is needed. For that, the key process indicators  $K_j$ , such as costs and times, should be introduced. The approach to simulation of the redesigned process model is planned for future work and the details of it are not discussed in the current paper. The whole improvement process can be repeated in case the changes are needed again, which is reflected in Figure 1 by the continuous loop sign.

Another notion which should be considered at all phases of the business process lifecycle, is the data which is inseparably associated with the business processes. Conventionally, the data in the enterprises is being stored in the corporate databases or data warehouses of ERP-systems [4]. In such approaches the optimization of the data usage is being reached by migration of data from different sources of the enterprise into a single storage which comprises of several stages such as data extraction, cleansing, transforming, indexing and loading. This migration is a technical processing of data based on the set of properties that guarantee that database transactions are processed reliably. However, such processing does not take into account the business context of the processes which are bound with the data objects. In our approach we are looking at the contextual dependencies of data objects within the business process and the ways to optimize them.

### 3 Decision Tasks

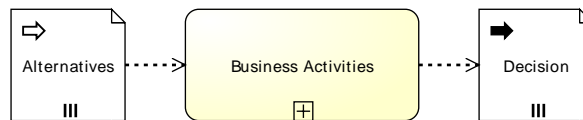
As it was already mentioned in the introduction to the paper, many business processes face the uncertainties of the business environment and the decision theory is a tool which is focused on dealing with such challenges. For instance, in the business process of scheduling the time of the meeting the participants might not know the preferences of the others so that they have to make the choice under uncertainty which can result in the longer time of the decision process.

For the sake of approaching the aforementioned challenge, the particular kind of the business processes, which incorporate decision making, should be introduced. With regard to the foundations of decision theory [3], we present here some of the notions which are relevant for business process management:

1. The core setting of the decision theory is an occurrence of a subject or a *decision maker* whose goal is to make an optimal choice between the *set of alternatives*. For example, in the business process scenario of scheduling the meeting, the participants of the process choose between several alternative dates, proposed by the organizer.

2. One of the main assumptions of the decision theory is that any realization of the alternatives resulting from a decision can be *compared*. Another important assumption is that the decision maker is making choice in a *rational way*. Both these assumptions are valid for business process management as its principle is to avoid ambiguities at the modeling level and ensuing consequences at the execution level which might result in non-optimal usage of resources.

The notions presented above became a premise for setting the special kind of business process models to which we refer as the *decision tasks*. The generic structure of the decision task is shown in Figure 2. Here the set of alternatives is



**Fig. 2.** Structure of the decision task

presented as the collection input data object and the final decision is presented as the collection output data object. An important assumption with the regard to the decision tasks is that the data presented by the output data object "Decision" is a subset of the input data object "Alternatives". More specifically, that could be represented as following: the values of data attributes of the output data object are subset of the data attributes of the values of the input data object. Whether this subset of the data object "Decision" consists of one or several data attributes or it contains only an empty element, depends on the context of the business process. For example, the owner of the business process of scheduling of meetings at the enterprise can define whether it is acceptable to schedule several dates of the series of meetings or exactly one date of a meeting should be identified. Another assumption for the introduction of the decision tasks is that the decision makers exist and they are represented in the process model by the resources bound to the decision task.

Now that the definition of the decision task was introduced, the approach for improvement of such a process model can be suggested. Below we present the approach for business process improvement which consists of three consequent phases corresponding to the stages of the aforementioned scheme (see Figure 1):

### 1.1 Analysis of Business Process Model.

The business process improvement scheme can be launched when the business analyst of the enterprise decides that the current business process is not efficient according to some indicators.

*Example. Organization of the scheduling of meetings at the enterprise is being done by a secretary which writes a personal e-mail to every participant of the meeting, collects the responses, chooses the date and sends it back to participants for confirmation. If less than required minimum of people confirm their participation, the process repeats. The structure of the process model*

is non-optimal and its execution produces many data artifacts (e-mails). The business analyst is aware about existence of the scheduling software and he wants to explore if the business process model can be redesigned.

**1.2 Detection of Decision Task.** As the next step in the first stage in the business process improvement scheme, the identification of the pattern for redesign is needed. More specifically, it should be identified if the current process model  $P$  represents a decision task with the structure presented in Figure 2.

*Example.* The business process of organizing the scheduling of meetings at the enterprise represents the decision task. Here the set of alternatives is the set of dates to be chosen and the participants are decision makers which choose the final date. If their preferences are collected by the secretary, they do not know about the choices of each other, so they make their choice under uncertainty.

**2.1 Definition of Payoff Function.** The improvement of the internal structure of "Business Activities" of the decision task can be done by the application of the decision theory methods. That could be done by investigating the data bound to the decision task, more specifically, the attributes of data objects. The persons or other resources, involved into the execution of the decision task, can be viewed as decision makers. And, according to the assumption of rational behavior of decision makers, their goal is to maximize the *expected payoff* of the decision task. Therefore, the assigned goal of this stage is to set the payoff function of the decision task.

*Example.* The payoff function in the business process of scheduling of meeting could be the time saved by participants to agree on the final date of the meeting.

**2.2 Optimization of Decision Task.** In such a way, we reduced the challenge of business process improvement to the task of maximization of the expected payoff of the decision task. The approach for solving this challenge, or, more specifically, the transformation  $T$ , could be done, for example, by granting access for the decision makers to the data produced by each participant. Then the decision makers will be able to estimate the payoff of their choices more precisely which might result in reducing the time spent on the decision making process and, consequently, in the time spent on the execution of the whole scheduling process. The outcome of the transformation  $T$  of the initial process model  $P$  is the improved process model  $P'$ .

*Example.* In case of choosing the date for the meeting, a dedicated web-page containing the table with all the alternative dates can be created which can be viewed by all the decision makers. That will enable the participants to make their decisions in accordance to the preferences of each other.

**3 Simulation of Redesigned Process Model.** In order to assess the efficiency of the transformation  $T$ , we plan to develop a set of indicators  $K_j$  and to conduct a simulation of the process model for estimating the values of these indicators. This is the final step of the improvement scheme, and, depending on the results of the simulation, the conclusion is made, either to accept the improved process model  $P'$  and start using it at the enterprise, or to conduct further improvements of the process model. Such a decision can be done, for example, by a business analyst or higher management.

## 4 Conclusion

In the presented paper we provided a hybrid approach for business process improvement, which consists in identifying a specific pattern in the business process model and in transforming this model in order to increase its efficiency. Also we presented several notions from the decision theory and showed how they could be correlated with the business process management. As a pattern for redesign, we introduced a special business process, the decision task, and showed that the internal structure of the decision task can be improved by maximization of the payoff of the task for the business process participants.

However, the presentation of the decision tasks and the transformation rule is not yet strictly formalized and should be done in the future. A notable limitation of our approach is that our investigation of the possibilities of the decision tasks improvement is bound to the dependencies between data attributes of the data objects of the processes at the modeling level. Nevertheless, in future we plan to enhance the approach with the execution semantics of the data objects.

As well, an extended formalization of the binding of the decision theory and business process management is planned which will allow to apply our approach to a broader class of business processes incorporating the decision making. For instance, in the current paper we referenced the business process of decision making in the business process of scheduling of the meetings, but it could be extended to the integrated time management at the enterprise. As another example of the decision tasks can serve the business process of the quality control of the product, where the evaluation is made independently by experts according to the predefined scale and the experts have to come to a compromise product assessment.

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