

# Process modeling method for higher education institutions based on BPR

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**Abstract** — Reengineering means radically rethinking the processes. In this sense, the objective of this article is to propose a conceptual model of a method of modeling processes adapted to Higher Education Institutions - HEI, based on the BPR - Business Process Reengineering. HEI is a type of company that has activity in order to provide services, but their operations have specific characteristics and a high level of complexity. The method can be applied in different processes in an HEI, because it covers specifics of the activity for possible significant improvements. To develop the method, concepts such Operations Strategy added to concepts of Business Process Management, based on the reengineering of processes were applied. The key advantage is that the application of proposed method, can ensure that the process is aligned with the strategy. For the application of the method 6 stages are defined. Therefore, the method can add the strategic result.

## I. INTRODUCTION

The process modeling is a tool used to represent the current situation and describe the future vision of the business process [1] [2] [3]. For business processes, it is understood that these are real world activities, consisting of a set of logically related tasks and, when executed in a suitable sequence and in accordance with the business guidelines, they generate a settled result. [4] Among the main objectives of process modeling as listed: i) improvement of processes, aiming to eliminate obsolete and inefficient processes and unnecessary rules and management; ii) standardization documents; iii) ease of documentation; iv) reading skill; v) homogeneity of knowledge for all team members and vi) full complement in the documentation of processes. For an example, at an HEI, you can set its strategy for a certain period; have a certain number of students enrolled in a particular discipline for a certain language. Therefore, the main activity of the HEI is teaching, since the student must attend a number of disciplines, the institution will offer these disciplines, meeting their demand. However, to move it forward on its strategy, the HEI must not only offer this discipline, but offer it in a definite language of the strategy plan as well.

The business process modeling has been used in various organizations in the production of goods (manufacturing) or services (operations) in various branches of activity. According to [5] traditionally, operations management was seen as being operational, but this view has changed

from the '60s, when the necessity emerged the definition of strategic objectives for the activities of operations because of lack of resources and the need to produce in large scale to minimize costs. The objectives are now ensuring that the value of production and delivery processes to the customer are aligned with the strategic intentions and the markets that the company intends to take over.

The modeling of business processes has improved the interactions between the interfaces, providing important information on the implementation of its operations. These improvements allow better understanding of the characteristics of the processes making clear the responsibilities of those involved in the operations that comprises the same. [6] [7]. In the interaction, the ability to implement processes and redesign costs and optimizing critical timing process are the focus point of this work.

## II. BACKGROUND

Among the existing modeling techniques are the BPM (Business Process Management) BPR - Business Process Reengineering and BPMN (Business Process Modeling and Notation). The Process Management, or BPM [8] [9] is defined as a set consisting of methodologies and technologies that aims at enabling business processes to integrate logic and chronological way, customers, suppliers, partners, influencers, employees, and each and every element with which they can, or want to have to interact, giving the complete picture organization and essentially integrated internal and external environment of operations of each participant involved in the business processes.

BPR is defined as "the fundamental rethinking and radical restructuring of business processes to achieve dramatic improvements in critical, contemporary indicators of performance such as cost, quality, service and speed". [10] And BPMN is used as an important tool in the implementation and restructuring processes. [11]. A modeled process will run their demands using fewer resources, be it financial, material or human. Once the operation is not dependent on the skill of the user that is running. This method uses the Operations Strategy concepts added to the concepts of Service Management Process based on reengineering processes expressed in BPMN notation. The notation was developed to provide

the use of the management of business processes through the establishment of standards [12].

The integration of reengineering and process modeling is applied as a method to improve the implementation of the operations involved in the processes. Thus makes it possible to manage the processes ensuring that its implementation will be aligned with the strategy defined by the organization. As if the strategy was the top of a mountain, or where the organization wants to reach, and processes are the paths that must be covered. Line up strategy to the process is to ensure that every step will shorten the distance to the top [13].

For an application where there is a requirement for modeling a process, many techniques may be engaged to better illustrate the process. A HEI, as well as other service providers are vulnerable to market demand, changes in the economy, seasonality and the inviolability [14]. And still, due to its type of business, higher education is a susceptible to specific issues such as the demand for courses, programs, performance indicators, standardized tests, scholarships, earnings, philanthropy, community service and a number of variables, such as: students, teachers, subjects, classrooms, research, training activities, readiness for market, internationalization, the incoming and outgoing exchange students, its infrastructure, the academic management systems, and the different levels of teaching undergraduate and graduate programs [15] [16]. However, the methods available in the literature, does not include the specific characteristics of a HEI. Thus, complexity levels, and specificities existing in a service process in a HEI [16] show the hidden requirement for a separate modeling method that is built according to its individualities.

### III. PROPOSED METHOD

The proposed method, different from generic modeling methods has the feature of encompassing the most diverse variables present in a HEI, and to propose a modeled process and eliminates rework, miscommunication, lack of formalization of activities, it will ensure the process and strategy are walking together. Through theoretical framework and literature of intersection shown in Fig. 1: Operations Strategy, Process Management and Business Process Reengineering.

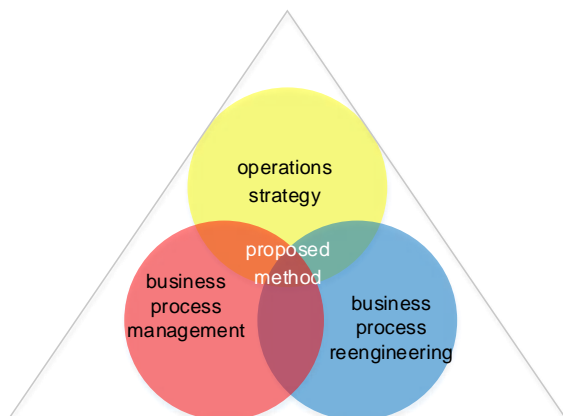


Figure 1. Intersection of literature that support the method

For its development, shown on Fig. 2, the proposed method comprises some steps that was withdrew from literature and organized systematically to facilitate its application, in which activities are carried out aimed at providing elements that will be needed during its execution.

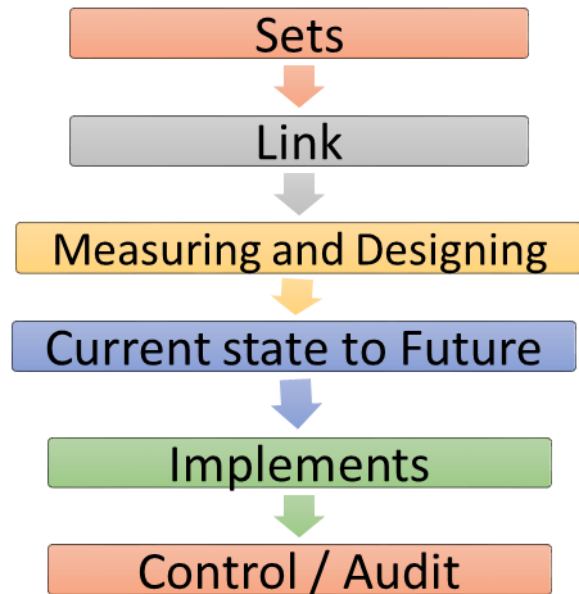


Figure 2. Steps execution of method

The established sequence to perform the steps of the method shown above, it was designed so that the elements of the processes for a HEI would be easily identified, as to define the process to be modeled for the activity "scholarship". It is possible to understand what is the connection with other variables in the second step, point it out how students grants will contribute to the organization's strategy, as an example, the HEI defines its strategy to have a number of students and out of that number, 40% of grant students, the next step will quantify this process, their time and pauses, as the interfaces connect and how this connection's arrangement. For a better example: when a student applies for a scholarship, he does it at the designated area, the department collects the request, forwards it to another area that runs a financial analysis, along with another area that does a credit check for the economic background of the student. For the next step, the process is depicted to show how process happens, or how it is "mapped out" and based on its results a new application is proposed to change the "modeling", this change can include an algorithm that automates the analysis involved in, streamlining activity, and makes it less susceptible to human mistakes. It is therefore validated the possibility of the modeled process, highlighting their contributions. Finally, it is necessary to control the changes, check if failures are occurring, due to problems of culture or resistance from those involved. The established sequence is shown on Fig. 2, and described their following steps:

#### A. 1<sup>st</sup> Process to be modeled

[17] and [18] suggests that the mechanism of the strategy of operations may be understood as follows: the organization defines the long-term investments, how and where they want to operate and in which businesses

operate, which is the corporate strategy. Therefore, at this stage, the goals to be achieved will be defined with the improvement, its scope, the formation of the change management structure to support the improvement, allocation of roles and responsibilities among those involved. For this phase, the activities will be as to:

- define who will be the sponsor/ owner/ leader of the process and what can it ensure its commitment;
- train and integrate the team with planning tools for the implementation of improvement;
- define the scope of the improvement to be held;
- create a work schedule.

### B. 2<sup>nd</sup> Connection with Organizational Strategy

For the process to be modeled in order to not only meet their demands, but rather fulfill a demand in order to be aligned with the organizational strategy. [13] Thus contributing to achieving the strategy defined by the organization, the goals become the guarantee that the value of processes and delivery to the customer are aligned with the strategic intentions and the markets that the company intends take over as detailed by [19].

- creating flowcharts illustrating the connection between process and organizational strategy using BPMN;
- analyze the influence of the strategy in the process;
- understand the process of contribution in strategy.

### C. 3<sup>rd</sup> Time measuring and flow designing

The business process management is a consolidated structured approach that meets standards and some of the possible best practices to identify, design, execute, to document, measure, monitor, control and improve business processes, automated or otherwise, to achieve the results consistent and aligned with the strategic goals of an [20] [21] organization. From the affirmation, at this stage, the time required for performing the process are measured, the breaks are described in the process and the bottlenecks showing the dependence on connections with other interfaces and the gained results. The purpose of this step is that starting from the collected information about timing and results, everyone involved must be acquainted with the current stage of the process. For such results, some activities were carried out:

- create metrics to measure performance;
- define which services are delivered to the customer, resulting from the process;
- collect the information to create the Workflow Map;
- Identifying bottlenecks;
- design workflow using BPMN notation.

### D. 4<sup>th</sup> Model the current status (AS IS) and propose future status based on Reengineering (TO BE)

From the implementation of the Business Process Modeling Notation BPMN, consolidated as the most important standard open graphical notation for drawing and modeling business processes [22], it makes it possible to design business processes as business process diagram and so enabling capture and document the current status (AS-IS) in clear diagrams, and design and describe the ideal status (tO-BE) [8] [23] [24]. Highlighting the

contrast between the "mapped out" process (AS-IS) and the application for the "modeling" process (TO-BE), according to the example shown on Fig. 3 as follow:

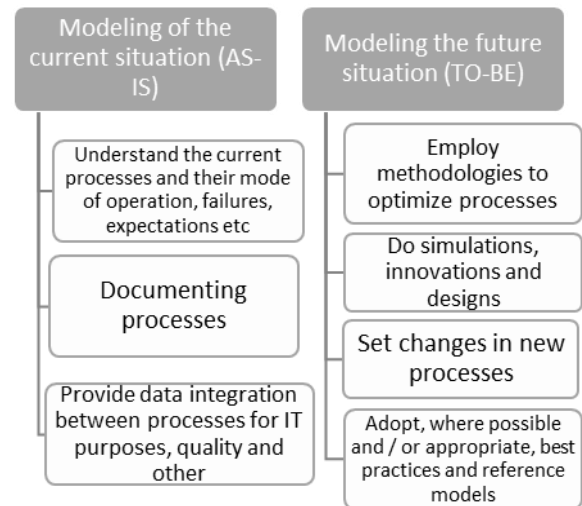


Figure 3. Current modeling for future modeling

For the development of this phase the information collected in the previous phase are used for the plan through technological tools which means that will be used to reach the improvement. The activities in this phase are:

- to clarify the source of bottlenecks;
- to analyze the flow map current process;
- to plan the future process flow map;
- to project the future layout;
- and to plan the flow movement from operations and people.

### E. 5<sup>th</sup> Implement the generated model

[10] Claim that to guide the work for processes, rather than departments, abolishes the functional areas, and people now belong to activities of the work flow, not a department that once welcomed people with similar specialties. The goals, which were previously departmental and different for each point of the work flow, are now combined by process, leading team activity. The very nature of the work changes. People who are specialized in only one type of activity, they are no longer desirable by the company. By establishing teams, the responsibility for implementing the process falls on everyone involved, and even if the person always try to keep the team together, one always seek to accomplish, within the team, tasks where someone is more skilled, there are no more limits to what each individual performance of responsibility. Everyone is responsible for the progress of the process, and everyone should know how it is done, and assist in the implementation. Guided by these concepts this stage aims to plan the execution and explicitly improves planned previous phases. Such activities consist of:

- set the improvement schedule to be implemented;
- plan the implementation necessities;
- create the deployment teams;
- train the deployment teams;
- train the operating of the targeted area of employees.

#### F. 6<sup>th</sup> Control / Audit

In modern companies, business processes, range from broad to a median location are typically multifunctional, that is the activity is fully carried out, and it must run by professionals with different skills and therefore is usually processed by different departments and organizational areas. [18] That means that the process is managed by different areas, which conducts are determined by performance indicators that allow no connection to the process, and are used to measure the efficiency of the area's resources, manage the process at different stages of the area. The lack of metrics to monitor the process performance and the lack of business processes management, responsible for analyzing the entire flow means that there is not effectively managing business processes [25]. On this last phase, right after the implementation the established improved process after its modeling, through the pairing of the data is carried out as detailed survey of the obtained results. Also after the implementation phase, an awareness campaign should be conducted with those involved, so that everyone understands the contribution and resulting improvement in the implementation of the proposed modeling. Thus becoming part of the organizational culture the vision processes based on the concepts of Business Process Reengineering.

The activities in this phase are:

- to create an advertising campaign that expresses the results;
- to highlight the importance of the view of culture by processes;
- to transfer the responsibility to a process flow manager;
- conduct the audits;
- create change patterns;
- create a manual for future modeling.

Therefore, the last phase stabilizes the changes made in the previous phase and prepares the organization for another improvement cycle.

#### IV. APPLICATIONS

The method has the characteristic of making it possible to model any process of an HEI, because it was designed to include its peculiarities, this is a variable that involves student billing, scholarships or exchange students. However, as the main academic contribution, their application enables modeled after the process, that had come to contribute to organizational strategy, consolidating its connection.

For the reception process of the exchange students the HEI will be able to, starting from the application process the method proposed to operationalize this step so that the assistance for this students should be standardized because different from regular student who is enrolled at the institution and will not require a special treatment, and exchange student will not be familiar with the school environment, and if each student in this situation requires a different attendance, there will be a major bottleneck. Another example is the use/implementation of management systems, the process is already exhibited, all bottom up will be available, along with the workflow process, so that the HEI can evaluate how your process will have to adapt to its new system, or highlight the

necessity to build the system oriented to the fit the requirements of the process.

Anyhow, the operation of the process must be intrinsically in harmony with the strategy. However, to move it forward on the way of its strategy, the HEI must not only offer this discipline, but also offer it in certain language in the strategy.

Consequently, the main advantage is that the method will ensure that the process is aligned with the strategy defined by HEI, as the result of a process will add the result to the strategy. The method includes the most diverse variables present in a HEI, and to propose a modeled process and eliminates rework, miscommunication, lack of formalization of activities, it can ensure that the process and the strategy are side by side.

The restraint of the article is that the method has not been applied yet in a case study. The contribution of the paper is to facilitate the integration between processes and strategic alignment by the method of process modeling for HEI. Future research may apply to the method in order to better verify the results, advantages and possible adjustments that may arise.

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