The Business Process Management Game

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Abstract. The Business Process Management Game is a serious game that teaches various aspects of business process management. Students can play the game in groups. Acting as the 'management team' of a business unit, they have to design a business process for that unit that is optimal in terms of cost, customer satisfaction, and waiting and service times. Groups compete with each other to create the process that performs best. In doing so, they can practice their business process modeling, analysis, re-design, and mining skills. The game got much positive feedback from students in official student evaluations of a course in which it is used.

Keywords: Business Process Management · Serious Gaming.

1 Introduction

Many universities teach a course on business process management (BPM) that addresses the full business process management life cycle[1]. Clearly, the most interesting way to teach such a course would be to send all students to a company, let them design and implement a business process, measure how the process performs and improve the process based on those measurements. Unfortunately, that is usually not feasible.

For that reason, we developed the BPM Game (https://www.bpmgame.org). The BPM Game allows students to perform BPM lifecycle tasks, including modeling, analysis, monitoring, mining, and re-design of a business process, in a simulated company. In this way students can practice the skills that they learn in theory in a simulated, but realistic, setting.

To the best of our knowledge, the BPM Game is the first of its kind. There exist a few serious games in the area of business process management. Most notably, the ImPROVE [2] and Innov8[2] games also aim to teach students the role that business process management plays in an organization. These games are 3D adventure games, in which the player plays a manager that has to manage a process. These games differ from the BPM Game in that the options for designing and improving the business process are restricted by the script of the adventure. For that reason they are less open than the BPM Game.

[1] http://fundamentals-of-bpm.org/uptake/
[2] https://mediacenter.ibm.com/media/0_0b3ayd6e

This paper presents the BPM Game, its features and how it is perceived by students. A short screencast that demonstrates the BPM Game is available at: https://youtu.be/BO-oiZUAxik.

2 Features

In the BPM Game, students can work in groups to design, monitor, and redesign a business process. The goal is to design a process that is optimal in terms of the costs of executing the process, the waiting times and service times that customers of the process experience, and the satisfaction of customers of the process.

Students are meant to follow the business process management lifecycle, and the theory corresponding to the steps in the lifecycle, as it is explained in the 'Fundamentals of BPM' book [1]. In that way the BPM Game allows students to directly apply the theory that they learn. Specifically, the BPM Game supports the modeling, analysis, redesign, execution, monitoring, and mining of business processes. Below, we explain each of these tasks in more detail.

2.1 Modeling

In the current version of the BPM Game, the students manage a business process for loan applications, but the BPM Game allows processes to be replaced relatively easily, such that assignments can be varied on a year-by-year basis. To process a loan application, several checks need to be performed to establish if the customer is eligible for a loan. Subsequently an offer must be made and finally the loan has to be paid out and monthly payments must be activated.

The tasks and resources that students can use, are predefined. Tasks and resources all have their own properties in terms of service times, required and produced information, and required and provided skills. For example, a task 'Check BKR' is defined that has a service time that is exponentially distributed with an average of 1 hour, requires a 'loan application' as input, produces a 'BKR check' as output that can have the values 'okay' or 'not okay', and requires the 'risk assessment' skill to be executed. Also, a resource 'John' is defined that costs 4,000 euro per month, and has the skills 'administrative work' and 'risk assessment'.

Figure 1 shows a simple example of a process as it could be defined. It shows that five tasks can be performed and the order in which they should be performed according to the designer. The tasks are assigned to the role 'Administrator'. Two resources, 'Murray' and 'Mose', are hired in that role.

Students have many choices with respect to the tasks that they can use to construct the model. For example, the model from Figure 1 only uses a single task 'perform credibility check', which encompasses all the necessary checks. However, there are also separate tasks 'perform BKR check', 'perform EVA check', and 'perform credit check' that can be used to construct the model. Other choices that have to be made include how to relate tasks, which resources to hire, and in which role to hire them.

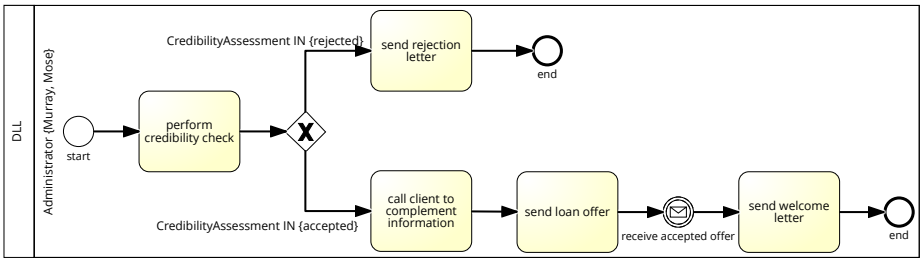

Fig. 1. Example model.

2.2 Analysis and Redesign

Students have several opportunities for optimizing their process and, while doing so, can use the theory from the book 'Fundamentals of BPM'[1]. In particular, the game considers theory with respect to:

- syntax and execution semantics of business process models;
- quantitative analysis of business process models; and
- redesign heuristics.

The BPM game checks models for syntactical correctness of core constructs, specifically: start, end and intermediate message and timer events, tasks, choice, parallellism and event-based gateways. If the model is not syntactically correct, the game provides detailed feedback. Incorrectness with respect to the execution semantics of the models is accepted, but will have consequences. For example, if a model has a deadlock or a livelock, cases may get stuck conform the model. Although employees will try to remedy undesirable situations (see Section 2.3). This will lead to delays and customer dissatisfaction.

There is ample opportunity for quantitatively analyzing the performance of the business process to explore different options, using simulation, flow analysis, or queuing model analysis, depending on the theory that is taught. Quantitative analysis can be used to analyze alternatives with respect to the control flow of the process and with respect to resources that are hired. This is especially interesting, considering that some resources are paid per hour, such that the 'utilization rate' of those resources plays a role in computing the cost of a solution.

Finally, process redesign heuristics [1] can be used to come up with alternative solutions. For example, the 'knock-out' heuristic can be used in combination with the various checks that need to be done, to do the checks that lead to the most rejections first, such that - in total - less checks must be done by employees in the process.

2.3 Execution

Once the students are satisfied with the design of their process, they can upload it to the game, where the resources that they selected, start executing it. Students can upload new versions of their process at all times, but changes will only take effect the next day.

The game runs in real-time. Every day between 9 and 5 customers arrive and are served according to the process that the students uploaded last. However, the employees will not simply perform the process as it is modeled by the students. Instead, the employees know which tasks must at least be performed for a particular customer, and which information and skills are needed to perform those tasks. If a required task is not performed, employees will try to fix the situation. Similarly, if the process tries to perform a task for which the required information or skills are not available, employees will also try to fix the situation.

The employees will not always succeed in fixing a problem and the fix that they will apply is not always the same. There are two reasons for this. First, this behavior mimics what happens in reality: when something goes wrong an ad-hoc fix is attempted that does not always work. Second, it does not make the game too easy, because if mistakes are made, the resulting behavior does not immediately reveal the optimal solution.

For example, if a process tries to perform a task for which the necessary information is not yet available, there is a possibility that the game will try to fix the situation by finding a random task that produces the necessary information first. There is also a possibility that the game will simply perform the incorrect task - at a penalty to cost and service time.

2.4 Monitoring and Mining

While the game is running, both real-time and historical information can be monitored. A real-time dashboard shows information on the tasks that are being executed, the activity of the resources over the day, and the status of the cases that have arrived over the day so far. The historical dashboard shows the daily costs of executing the process, as well as the average throughput time, service time and waiting time of cases.

Students compete with each other for the best process. To that end a leaderboard of student groups is presented, where each student group is ranked on their performance with respect to costs, customer satisfaction, and throughput time. Their rank on the overall leaderboard is determined by the average of their rank in these three categories.

Figure 2 shows the historical dashboard. It shows the daily process costs and the leaderboard. The screenshot also shows a radar diagram in which the performance of the current group is compared to the performance of the best group. In Figure 2 the selected group has a high ranking with respect to waiting time, but a low ranking with respect to cost. It is easy to see that that can be the result of hiring many resources to do the work, which leads to low waiting times, but high (resource) costs.

Students can download the execution log of the process, including the tasks that were performed, start and end times of tasks, resources that performed the tasks, and information that was established in the tasks. They can use this log to mine the process model, using process mining tools such as Disco[3] and Celonis[4].

[3] https://fluxicon.com/disco/
[4] https://www.celonis.com/

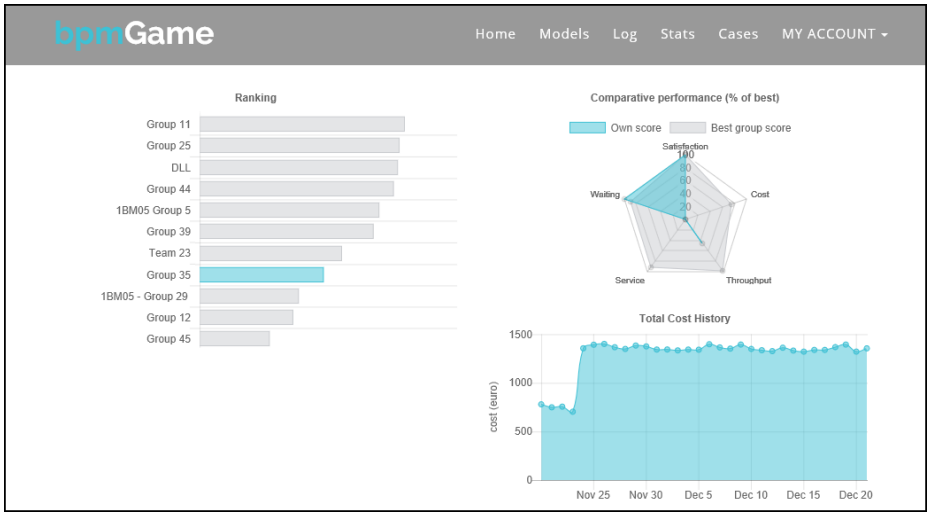

Fig. 2. Monitoring KPIs.

3 Maturity

The BPM game has now been used for 4 years in a course at Eindhoven University of Technology. On average 193 students participated in the game per year, with participant numbers between 168 and 227. Students were grouped into 50 groups on average, with the number of groups ranging between 45 and 58. Student evaluations were very positive on the game. Out of 62 open comments that students made about the course in the last student evaluation, 32 explicitly mentioned the game as a positive element of the course. 1 mentioned it as a negative element. Students commented that they enjoyed playing the game, that it kept them engaged in the course, that they liked the competitive element, that the game helped them to understand the theory, and that it gave them new insights. The negative comment, was that the criteria for grading the assignment that came with the game were unclear.

References

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