
Gameful Business Process Modeling

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Abstract: Gamification is a recent trend concerned with the use of game design elements in non-game applications. This PhD research proposal discusses the use of gamification for business process modeling in participative BPM scenarios. To that extent, a modeling tool allowing users to earn points and badges and compare themselves with others on a leaderboard is described. A discussion of initial, mixed results is provided.

Keywords: Gamification, Social BPM, Business Process Modeling, Modeling Software

1 Introduction

Gamification is a relatively novel phenomenon that denotes the use of game design elements in other, non-game contexts [De11] such as education, training, health, and work [HKS14]. While originally an industry-driven trend, gamification has recently become a well-embedded constituent of the academic discussion in fields such as Computer Science, Human-Computer Interaction and Information Systems. Empirical studies have repeatedly shown that it can deliver a diverse range of benefits, including an improved motivation, engagement, enjoyment, and learning of the “gamified” systems’ users, as well as behavioral changes [SF15]. The goal of the outlined PhD research project lies in an examination of the impacts of gamification through its implementation in a commercial business process modeling tool. The motivation for this endeavor is grounded in the expectation that Business Process Management (BPM) and its related activities will increasingly be democratized, thus transcending the domain of a small number of experts and coming into the area of influence of a much larger, heterogeneous number of potential participants [PV14]. An indicator for this is the emergence of Social BPM, i.e., an approach to BPM based on the principles of social software, including bottom-up self-organization, egalitarianism, and social production [Er10]. The main goals of Social BPM lie in improving the acceptance of business processes by including all relevant stakeholders in their conceptualization, as well as leveraging the ideas for process improvement and innovation of process end-users. However, such an approach comes with its own challenges, such as engaging and motivating employees to actually participate, educating and training BPM novices, and providing them with tools they can actually work with to create high-quality process models [PV14]. Gamification is envisioned as a tool that can help overcome these challenges and thus enrich BPM in democratized settings. The research endeavor follows the Design Science Research Process proposed by PEFTERS ET AL. [Pe07] and is currently in the evaluation stage of its first iteration. The remainder of this proposal consists of a description of a gamification concept in Section 2 and a prototypical implementation in Section 3, a discussion of initial evaluation results in Section 4, and a conclusion and outlook.

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2 Concept

This concept outlines how the reported benefits of gamification can be leveraged to address some of the challenges that participative approaches to BPM entail. To that extent, gamification functionality shall be integrated into a business process modeling tool to support the goals of Social BPM and the goals of participating users. There is an understanding that the use of software tools holds considerable benefits for BPM projects [IEH99, Re12]. In particular, such tools can provide features complementary to the underlying modeling grammar that enrich working with the latter [Re12]. Following that logic, gamification can be instantiated as such a complementary modeling feature. The set of possible game design elements for gamified applications is vast, and as of yet there is no formal, validated approach that helps with their selection and composition. However, a set of three elements can be found in the overwhelming majority of implementations [HKS14, SF15]: points, badges, and leaderboards. *Points* represent a virtual currency that users can earn for the quantity and quality of work they perform. *Badges* are special distinctions users may earn for particularly remarkable behavior that are prominently featured on user profiles. Lastly, *leaderboards* present a ranking of users according to the points they have accumulated and are intended to stimulate competitive behavior. To gamify business process modeling, the activity must be reconceptualized as a gameful activity. Formally, a game can be defined as “a rule-based, formal system with variable and quantifiable outcomes, where different outcomes are assigned different values [and] the player exerts effort in order to influence the outcome [...]” [Ju11, pp.7-8]. Similarly, in business process modeling rules are imposed, e.g., by the modeling language, different outcomes are alternative solutions for a particular modeling task, different values are the qualities of the respective models, and the players are modelers who exert effort to create the best-possible model. This results in the notion of *gameful business process modeling* as an activity in which the performance of the modeler is constantly evaluated by measuring the quality of the current process model, rewards such as points and badges can be earned for the work that is done, and a leaderboard allows for a comparison with other modelers. Through this, the following positive effects can be expected: Firstly, the availability of points and badges increases the engagement and motivation of users to participate in Social BPM. Secondly, the availability of real-time modeling feedback coupled with rewards will both enable and motivate modelers to create high-quality process models. Lastly, the combination of these two factors will allow modelers to develop good modeling habits and practices over time. It must be noted that this concept is focused on short-term, extrinsic motivation, which is appropriate for initial implementations, but may not be able to reap the full potentials of gamification.

3 Implementation

To demonstrate the feasibility of the concept, points, badges and a leaderboard were incorporated into a business process modeling tool as a prototypical implementation. The interface of this implementation is depicted in Figure 1, with the central dotted box labeled *C (Canvas)* representing the modeling area. Central to the gamified modeling experience is box *F (Feedback)* which provides information about the quality of the current model in

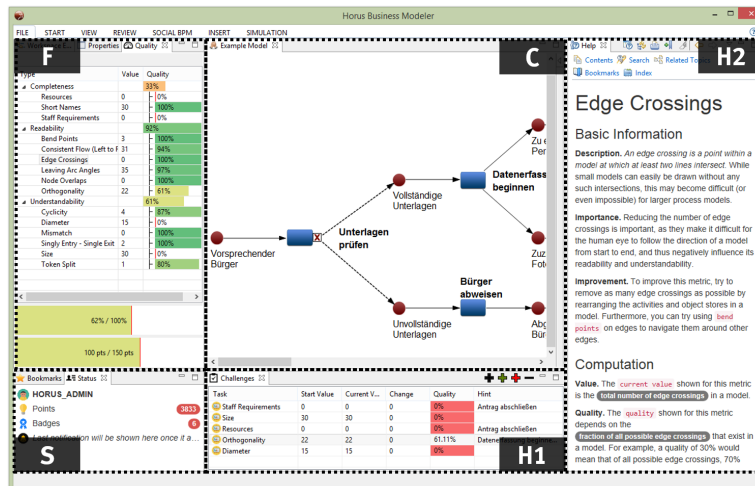


Fig. 1: Overview of the interface with gamified feedback and outcomes. Regions: Canvas (C), Feedback (F), Status (S), Help (H1, H2).

real-time. Based on relevant literature (cf., e.g., [Pu02, Me08]), the prototype provides an experimental set of quality metrics addressing aspects of the readability, understandability and completeness of process models. In general, a user can earn 10 points per quality metric. With every change to the model, quality metrics that are affected are instantly updated, and thus it becomes possible for modelers to directly see the effects of their actions. Upon saving, a notification about the obtained points is shown to the user in the status panel (box S). Users can also unlock badges for reaching certain modeling milestones or performing particular actions, such as having created 10 process models, removed 100 edge crossings, or having written 10.000 characters of textual descriptions. The total number of badges earned by a user so far is also displayed in the status panel (box S) and a notification is displayed when a new achievement is unlocked. The implementation also consists of additional help features (boxes H1, H2) that provide further details and information about quality metrics to novice modelers. These are only peripheral to the gamification functionality, but can support learning. Also provided, but not depicted here, are user profiles as records of achievement, and a leaderboard for competition with others.

4 Evaluation

The prototype has been applied in a field study ($n = 173$) and a controlled experiment ($n = 58$) with Bachelor-level Information Systems students at the University of Münster. In the former, students were working on a process modeling case study over the course of a semester, whereas the latter consisted of a 45-minutes mock exam. In both, students were randomly distributed between working with/without gamification. The evaluation is still ongoing and has presented initial, mixed results. In the field study, students using gamification have engaged with the tool more as measured by the average number of logins.

Furthermore, they exhibited a more positive attitude towards the tool. Interestingly, with the exception of “completeness” (i.e., providing as much metadata about process elements as possible), the quality of the resulting process models were equal for both groups. Results are comparable for the controlled experiment: model qualities were almost identical, but students using gamification made a smaller number of technical modeling errors. Additionally, they were less confident about the quality of their results, which may be due to negative effects of the real-time quality feedback on overconfidence. Lastly, they reported a higher perceived usefulness of the tool and intention to use it again in the future. Some of these results are unexpected and require a more in-depth examination in the future.

5 Conclusion

This paper has presented a gamification-based approach for enriching Social BPM. It has described a concept based on points, badges, and leaderboards to turn business process modeling into a gameful activity and discussed its prototypical implementation in a commercial tool. Initial results from a field study and experiment paint a mixed picture, which may lead to a refinement of the gamification concept in the future.

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